DEPARTMENT OF THE NAVY, NAVFAC SW,
DESERT INTEGRATED PRODUCT TEAM,
SAN DIEGO CA
26 February 2009

REPAIR AIRFIELD PAVEMENTS
PULL THROUGH SPOT 607
at
TRAVIS AIR FORCE BASE
FAIRFIELD, CALIFORNIA

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01110 SUMMARY OF WORK
01140 WORK RESTRICTIONS
01150 SPECIAL PROJECT PROCEDURES
01200N PRICE AND PAYMENT PROCEDURES
01310 ADMINISTRATIVE REQUIREMENTS
01321N NETWORK ANALYSIS SCHEDULE
01330 SUBMITTAL PROCEDURES
01420 REFERENCES
01450N QUALITY CONTROL
01455A CHEMICAL DATA QUALITY CONTROL
01500 TEMPORARY FACILITIES AND CONTROLS
01525 SAFETY REQUIREMENTS
01560 ENVIRONMENTAL GENERAL REQUIREMENTS
01572 WASTE MANAGEMENT
01575T TEMPORARY ENVIRONMENTAL CONTROLS
016302N UNDERGROUND TRANSMISSION AND DISTRIBUTION
01770N CLOSEOUT PROCEDURES

DIVISION 02 - SITE WORK

02111 EXCAVATION OF HANDLING OF CONTAMINATED MATERIAL
02220 DEMOLITION
02300 EARTHWORK
02582 ELECTRICAL HANDHOLD
02620 SUB DRAINAGE SYSTEM

02704 AGGREGATE BASE COURSE FOR FLEXIBLE PAVEMENTS
02705 BASE AND SUBBASE COURSE FOR RIGID PAVING
02706 DRAINAGE LAYER
02748 BITUMINOUS TACK AND PRIME COATS
02749 HOT-MIX ASPHALT (HMA) FOR AIRFIELDS
02754 CONCRETE PAVEMENTS FOR SMALL PROJECTS (LESS THAN 2500 CY)
02761 PAVEMENT MARKINGS
02762 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS
03300N CAST-IN-PLACE CONCRETE

-- End of Project Table of Contents -

SECTION 01110

SUMMARY OF WORK
05/05

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

Repair /Replace airfield parking spot 607: Remove/replace existing concrete pavement with new 17″ thick Portland Cement Concrete (PCC), over 12″ thick Cement Treated Base (CTB). Provide grounding system for C-17/C-5 aircrafts. Paint taxi line, nose gear and other marking disturbed during construction. All underground utilities shall be protected at all times and shall be repaired at no additional cost if disturbed.

1.1.2 Location

The work shall be located at the Travis Air Force Base, Fairfield, California, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.2 SPECIFICATIONS

These specifications are divided into several trade sections for convenience and not to establish the limits of the work required of any trade. It shall be the Contractor's responsibility to allocate the work between appropriate trades. In the event of a discrepancy between the contents of the accompanying drawings and specifications(s), the specifications shall govern in accordance with FAR 52.236-21 "Specifications and Drawings for Construction."

1.3 DEMOLITION, REMOVALS, AND EXCESS MATERIALS

All materials, equipment, and refuse generated through the demolition work required by this contract shall become the property of the Contractor and shall be disposed of by the Contractor off base at the Contractor's expense unless specifically listed otherwise in the demolition section of the specifications. The Contractor should be aware that within the confines of Fairfield, California, including Travis Air Force Base, if the Contractor subcontracts for the removal of debris refuse that the City of Fairfield has an exclusive franchise agreement with Solano Garbage Company, (707) 422-4244, to perform such service. Hazardous material removal and disposal shall be accomplish in accordance with all applicable codes and regulations and shall be the sole responsibility of the Contractor.

1.4 EXCAVATION

Excavation of any kind is prohibited prior to processing a duly executed Excavation Permit, 60 AMW, Form TAFB 55. The Contractor

shall mark the area to be excavated at the site in white chalk paint prior to processing the WCR and shall provide a drawing/sketch of the area to be excavated along with the WCR form. After the contractor marks in white the area where work (excavation) is to be accomplished (phased construction will require additional clearance requests), Base Civil Engineering, Base Communications, or their agents will mark the utilities in the field. Once the utilities have been marked, the Contractor shall be responsible for transferring any markings not accurately indicated in the drawings onto field drawings and providing a signed copy of these drawings to the Contracting Officer's Representative for approval. Once approval has been received, the Contractor takes responsibility for keeping the utilities marked until work is completed in the area. On projects where excavation in the marked area can not be completed within 90 days, a new permit is required for any future excavated areas. Excavation prior to completion of such permit shall be at the Contractor's risk. Any damage to utilities or other government property as a result of such excavation shall be repaired or replaced by the Contractor at no additional cost to the government. Any damage to utilities owned or maintained by other companies will be repaired by the Contractor or will be paid for by the Contractor for the company to repair the utility at the company's option. Obtaining the permit is the responsibility of the Contractor. Obtain an Excavation Permit, 60 AMW Form 55, from the Excavation Permit Office in CE Maintenance Engineering (Bldg. 878). Allow up to 21 calendar days for permit processing.

1.5 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.6 LOCATION OF UNDERGROUND FACILITIES

Obtain digging permits prior to start of excavation. Scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities,and any type of underground obstruction not indicated to be specified or removed but indicated or discovered during scanning in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made

1.6.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

1.6.2 Underground Facilities

In addition, the Contractor shall contact Underground Service Alert for review and coordination by commercial telephone, gas, and electrical companies. Final signature must be obtained from the Chief of Operations Flight, 60 SPTG/CE, located in Building 878, Travis AFB. Permit forms shall be completed with an original and six (6) copies.

1.6.3 Contaminated Soil

If evidence of possible soil contaminants is found in the process of excavation and/or soil removal, the 60 CES/CV shall be notified immediately.

1.7 PROTECTION

Contractor shall be solely responsible for furnishing, erecting, maintaining, and removing all protective barriers, signs, temporary lighting, etc., required for protection of persons and property. Open flame devices of any kind are prohibited. Driving vehicles on grassed areas is prohibited during construction unless a request has been submitted in writing and approved by the Contracting Officer.

1.8 TRADE NAMES

Trade names of specific products in this specification are used only for purposes of defining quality and performance. They are not used to preclude the use of products or equal characteristics by other manufacturers. The Government reserves the right to determine equality. Physical dimensions, color, and texture will also be considered in determining equality. All items shall be submitted one time for approval.

1.9 PROGRESS CHART

Reference FAR 52.236-15. The salient features of the Progress Schedule shall consist of a minimum of one items for each division of the specification. The divisions shall follow the CSI division format listed in the table of contents of these Specifications. The Contractor need list only divisions that are used in the specifications. He may further subdivide as to best suit his needs. On the Progress Schedule, the contractor shall also provide columns breaking down labor and material percentages for each element of work so that they total the percentage in column "C" on the schedule.

1.10 CONTRACTOR'S RESPONSIBILITIES

1.10.1 Contractor Site Visit Prior to Bid Openings

The Government will conduct a site visit to the construction site prior to bid opening. The date and time of the site visit is shown in the Instruction to Bidders portion of this Specification. The

Contracting Officer will require all contractors to sign in on an attendance sheet prior to the site visit. As a result of the site visit, all prospective bidding inquiries for document clarification or other clarification shall be submitted to the Contracting Officer no later than 15 days prior to scheduled bid opening. The Government reserves the right not to provide a written technical response to inquiries received after 15 calendar days prior to scheduled bid opening. It is the Contractor's sole responsibility to attend the site visit and to observe all conditions at the site, which may impact a contractor's potential bid. The Government does not expect the contractor to do any physical testing and/or removal of items at the site visit. The Contractor is responsible for observance of those conditions directly exposed to view.

1.10.2 Advance Notification

The Contractor shall notify the Contracting Officer (CCI) of the date work will commence under this contract at least two (2) working days prior to beginning work.

The Contractor shall notify the Contracting Officer (CCI) of at least one (1) working day in advance of any period when work will not be in progress during the performance of this contract.

1.10.3 Emergency Telephone Number of Contractor's Representative

In an effort to insure the protection of the interests of both the Contractor and the Government. The Contractor is hereby required to furnish at last one name and telephone number of a representative to be contacted, during other than normal working hours, in the event of an emergency. This information is requested to be supplied at the Pre-Performance Conference, which will be held within the time specified in the contract.

1.10.4 Items to be Performed by Contractor

The Contractor shall furnish the Contracting Officer, at the pre-performance Conference, the items of work, which will be performed with the Contractor's forces and the estimated cost of those items unless those items were submitted with the Contractor's bid. See Contract Clause entitled "Performance of Work by Contractor".

1.10.5 Pre-Construction Conference

After award of the contract, but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the safety program, preparation and submission of the schedule of prices, shop drawings, and other submittals, scheduling, programming and prosecution of work. Major subcontractors who will be engaged in the work shall also attend.

1.11 PROJECT CONSTRUCTION GOALS

The Navy is evaluated by the Air Force in the administration of this construction contract. The Navy strives to meet "High Scores" for all construction categories for subject construction project. Contractor

evaluations will reflect cooperation in obtaining goals. High scores shall be defined as follows:

Cost Growth

High Score = less than 3%
Middle Score = 3% to 6%
Low Score = Greater than 6%

Schedule Growth

High Score = less than 10%
Middle Score = 10% to 20%
Low Score = Greater than 25%

Construction Timeline (NTP to BOD)

PA less than $ 5M = 365 days
PA between $5M and $20M = 540 days
PA greater than $20M = 720 days

Financial Closure

High Score = less than 8 months
Middle Score = 8 to 12 months
Low Score = Greater than 12 months

1.12 PROGRESS AND COMPLETION PHOTOS

Provide monthly, and within one month of the completion of work, digital photos, 1600x1200x24 bit true color 150 minimum resolution in JPEG file format showing the sequence and progress of work. Take photos prior to the seventh day of each month from a minimum of ten views located by the Contracting Officer's Representative. Submit a sketch or drawing indicating points of view. Submit with the monthly invoice two sets of digital photographs, each set on a separate CD-R, cumulative of all photos to date. Cross reference submittals in the appropriate daily report.

1.13 SUPERVISOR

Have at least one qualified supervisor capable of reading, writing, and conversing fluently in English language on the job site during working hours. In addition, if a Contractor Quality Control Representative (CQCR) is required on the contract, then that individual shall also have fluent English communication skills.

1.14 GOVERNMENT-FURNISHED MATERIAL AND EQUIPMENT

There are no Government furnished materials and equipment.

1.15 GOVERNMENT-INSTALLED WORK

There is no Government-installed work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

SECTION 01140

WORK RESTRICTIONS
10/05

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(Latest Edition) Safety -- Safety and Health Requirements

1.2 SPECIAL SCHEDULING REQUIREMENTS

A. Permission to interrupt any Base airfield operations, and/or utility service shall be requested in writing a minimum of 30 calendar days prior to the desired date of interruption.

1.3 FLIGHTLINE ACCESS

1.3.1 General

For entry of Contractor-owned vehicles to Travis AFB flight line, the Contractor shall comply with the following procedures in accordance with Travis AFB Instruction 12-103 (TAFBI 13-103), Vehicles Operations on the Flight Line.

1.3.2 Application and Approval Procedures for Commercial Vehicular Entry.

All vehicle operators will be trained by 60 CES VCNCO or 60 OSS/OSAA representative prior to driving on the flight line, or be escorted by a qualified individual. Letters documenting training has been accomplished will be signed by vehicle operators and maintained by Airfield Management until no longer needed.

1.3.2.1 Application Procedures

Applications shall be prepared in letter form (3 copies) on company letterhead stationery, signed by the senior company representatives on Travis AFB, and submitted to the Chief, Airfield Management, 60 OSS/OSAA. As a minimum, applications shall include the following information.

a. Total number of vehicles requiring entry.

b. Type, make, State of registration, and license number of each contractor vehicle.

c. Location of company/firm name on each vehicle.

d. Air Force contract number, type, and expiration date of contract.

e. Frequency of entry into flight line areas on official business and justification therefore.

f. An approval by the contract monitoring military unit/agency indicating mission necessity.

1.3.2.2 Forwarding

Base Operations Officer shall forward all applications to the Base Commander for approval.

1.3.2.3 Approval

Approved applications (originals) will be returned through channels to the applicant. Applicant shall retain this letter for the duration of the contract period. The second copy will be forwarded to 60 SFS/SFA and the third copy will be retained by Base Operations, 60 OSS/OSAA. Base operations shall be notified immediately of any changes to paragraph Forwarding.

1.3.3 TAFB Flight Line Vehicle Permit

Vehicle permits are colored placards that hang from the rear view mirror of vehicles authorized for flight line use, and are distributed on a temporary basis by Base Operations (60 OSS/OSAA). Each contractor vehicle will be assigned a vehicle permit, and a record of the permit number and associated vehicle information will be maintained in Base Operations. To obtain a vehicle permit Contractor personnel are required to read TAFBI 13-103, Vehicle Operations on the Flight Line, and be trained by a qualified representative. The vehicle permit will be displayed on the rear view mirror at all times when operating on the flight line, and kept from view when operating off the flight line. Upon completion of the contractor, all vehicles permits will be returned to Base Operations.

1.3.4 BASE REGULATIONS

The Contractor shall conform to all Base Regulations and directive (as specifically identified at the pre-performance conference) that pertain to security, safety, traffic, fire, and personnel clearance, insofar as they apply the Contractor's activities. Ensure that Contractor personnel employed on the Base become familiar with and obey Base regulations. Keep within the limits of the work and avenues of ingress and egress. Do not enter restricted areas unless required to do so and until cleared for such entry. Permission to interrupt any base, roads or railroads shall be requested in writing a minimum of 21 calendar days prior to the desired date of interruption. The Contractor's equipment shall be conspicuously marked for identification. Wear hard hats in designated areas.

1.4 UTILITY OUTAGES

Outages for utility tie-ins/shut downs require prior approval of the Contracting Officer. All requests for outages shall be submitted in

writing to the Contracting Officer at least 30 calendar days in advance of the proposed date.

1.5 CONTRACTOR SECURITY OF JOB SITE

The Contractor shall fence off the storage/laydown area boundaries, and have all access gates secured with keyable locks. The fence shall be of chain link construction with brown fabric on fence, and be 8 foot high minimum. The Contractor shall furnish the duplicate gate keys to the Base Fire Chief, and the designated Contracting Officer's Representative.

1.5.1 Removal

All temporary fences and structures that the Contractor uses to protect his materials shall be removed and the site restored to equal or better than original condition.

1.5.2 Cleaning

The storage area shall be cleaned of all debris and demolition material and repaired as required to bring the site back to its original condition.

1.6 CONTRACTOR ACCESS AND USE OF PREMISES

1.6.1 Base Regulations

Ensure that Contractor personnel employed on the Base become familiar with and obey Base regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

1.6.2 Working Hours

Regular working hours shall consist of an 8 1/2 hour period established by the Contracting Officer, Monday through Friday, excluding Federal Legal Holidays.

1.6.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 7 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer.

1.6.4 Utility Cutovers and Interruptions

a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."

b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, and fuel shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours." Such interruption shall be further limited to 8 hours. This time limit includes time for deactivation and reactivation.

d. Operation of Base Utilities: The Contractor shall not operate nor disturb the setting of control devices in the base utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

e. The Government reserves the right to reschedule the Contractor's proposed outage if deemed necessary.

f. The Contractor shall notify the Contracting Officer and the Base Fire Department prior to the shutdown of emergency utilities.

1.7 BASE TELEPHONE CABLES

Base telephone cables are considered a utility and must be accorded the same protection as electric, water, and any other utility. Unlike other utilities however, damaged telephone cables may be only repaired using the Base telephone contractor. All damage, however slight, to these cables must be reported immediately to the Contracting Officer and Base Communications at extension 4-2566. The Contractor causing the cable damage will be billed for repairs after the fact, based on actual Government cost. If in use telephone cables need to be relocated, usually determined during the digging permit process, the Base leased Communications Office 60 CS/SCXL at extension 4-3052 must be informed as soon as possible to take appropriate action.

1.8 DEMOLITION, REMOVALS, AND EXCESS MATERIALS

All materials, equipment, and refuse generated through the demolition work required by this contract shall become the property of the Contractor and shall be disposed of by the Contractor off base at the Contractor's expense unless specifically listed otherwise in the demolition section of the specifications. The Contractor should be aware that within the confines of Fairfield, California, including Travis Air Force Base, if the Contractor subcontracts for the removal of debris refuse that the City of Fairfield has an exclusive franchise agreement with Solano Garbage Company, (707) 422-4244, to perform such service. Hazardous material removal and disposal shall be accomplish in accordance with all applicable codes and regulations and shall be the sole responsibility of the Contractor.

1.8.1 Emergency Telephone Number of Contractor's Representative

In an effort to insure the protection of the interests of both the Contractor and the Government. The Contractor is hereby required to furnish at last one name and telephone number of a representative to be contacted, during other than normal working hours, in the event of an emergency. This information is requested to be supplied at the Pre-Performance Conference, which will be held within the time specified in the contract.

1.9 FIRE PREVENTION

1.9.1 Responsibility

The Base Fire Chief or his representative will attend pre-construction conferences to brief Contractor on pertinent fire regulations and to provide guidance for fire safe operations during contract performance. Fire prevention guidance will be furnished to the Contractor for briefing his personnel.

1.9.2 Fire Prevention Rules

1.9.2.1 Smoking

Smoking is prohibited on the jobsite, including temporary facilities, except in areas designated "Authorized Smoking" as approved by the Base Fire Chief or his designated representative. Discarded smoking materials shall be placed in special non-combustible receptacles and disposed of each day in a fire-safe manner.

1.9.2.2 Fire Reporting

Any person who discovers a fire shall report it immediately, even when it is distinguished without the aid of the Fire Department. This shall be done by:

(1) Sounding the alarm locally by activating the installed fire alarm or by shouting to notify the occupants.

(2) Telephone reporting of fires:

a. All base phones except Family Housing: Dial 911

b. To report a fire from Family Housing: Dial 911

c. Non - base phones need to call 707-424-4911

(3) Giving the Fire Department the following information:

a. Building Number.

b. Type of fire (building, grass, automobile, etc.)

c. Exact location of the fire in the building (1st, 2nd, 3rd floor, north end, South end, etc).

d. Name of person reporting the fire.

1.9.2.3 Heating

Non-explosion proof electrical heaters and call open flame heaters are prohibited for use in any facility or area where volatile vapors are present or may accumulate.

1.9.2.4 Electrical

a. During Fire Prevention inspections, all appliances deemed unsafe and connected to an electrical distribution system shall be disconnected from the electrical system until approved by a competent electrician.

b. In buildings where volatile liquids are used and/or stored, only vapor-proof type drop cords shall be used.

c. All flexible cords on appliances shall be continuous lengths and shall be kept in good condition without splice tape.

1.9.2.5 Housekeeping

a. Trash shall not be allowed to remain in any area or building overnight.

b. Only non-combustible trash containers and waste paper containers shall be used.

c. Trash shall not be allowed to accumulate on the floors, in attics, or underneath stairwells or buildings. Attics and the area underneath stairwells shall not be used for storage without prior written approval of the Base Fire Chief.

d. Outdoor trash receptacles shall be located at a reasonable safe distance from buildings. Trash and litter, including scrap lumber, shall not be stacked less than twenty (20) feet from any building.

e. Rags shall be kept in a metal container with metal lid. Oily rags shall be removed from the building at the end of each work day. All containers shall be properly labeled with the contents.

1.9.2.6 Flammable Liquids

a. Flammable liquids shall be stored only in designated buildings and areas with "FLAMMABLE" and NO SMOKING" signs prominently posted.

b. Gasoline shall not be stored in any building on Travis AFB without written approval from the Base Fire Chief.

c. A supplemental supply of flammable liquids kept on the premises shall be limited to the amount necessary for one day's use. This supply shall be kept in approved (spill proof container) safety cans stenciled with the name of the contents and the word 'FLAMMABLE".

d. All paint storage sheds shall be at least fifty (50) feet from any building .

e. All spray painting shall be done in compliance with established industry safety practices and current regulations.

f. Blow torches or any type of open flame are prohibited for removing paint or tile from any type of surface.

g. The tanks on any small gasoline powered engine shall be drained and purged before storing in any building on Travis AFB unless a specific building is designated for this purpose and approved in writing by the Base Fire Chief.

1.9.2.7 Liquid Powered Equipment

a. In all areas where an accumulation of explosive gases is likely to occur from the use of power equipment, adequate ventilation shall be maintained.

b. Privately owned vehicles shall not be parked in any building or structure other than those designated and approved in writing for this purpose.

1.9.2.8 ARC Welding, Torch Welding, Cutting, and Brazing

a. Welding, cutting, or brazing within or around any structure, other than approved welding shops, will require permission from the Fire Department and the issuance of a Welding Permit.

b. Backflow protection shall be provided by an approved device that shall prevent oxygen from flowing into the fuel gas supply system or fuel gas flowing into the oxygen supply system.

c. Flashback protection shall be provided by an approved device that shall prevent the flame from passing into the fuel gas supply system. Install the flashback protection at the gages.

d. Only certified welders shall operate welding equipment.

e. All equipment shall be inspected daily for damage, loose connections, and unsafe conditions. Repair replacement shall be made if required.

f. When precautionary measures have been taken and fire hazards continue to exist, a fireguard provided with suitable fire extinguishing equipment shall be stationed near the welding location.

1.9.2.9 Ventilation

During any work in which a concentration of flammable vapors or dust is likely, all open flames shall be extinguished and the building

shall be adequately ventilated. Precautions shall be taken to insure that electrical circuits are not activated.

1.9.2.10 Water Shut Off

Do not shut off water mains and fire hydrants or perform any maintenance that will interfere with the water supply on the Base without first notifying the Base Fire Protection Branch, extension 424-3886.

1.9.2.11 Fire Prevention

For all potential fire hazards and actual emergencies not specifically covered in this section, the exercise of good common sense will usually suffice. When in doubt, call the Fire Prevention Section for assistance, extension 424-2328 or 424-3683. Refer to COE EM 385-1-1.

1.9.2.12 Asphalt and Tar Kettles

a. Asphalt and tar kettles shall be located a minimum of twenty (20) feet from any building. Kettles in use shall be continuously supervised.

b. Asphalt and tar kettles shall be equipped with a temperature gauge. The temperature gauge shall be kept visible and in good working order.

c. Containers of compressed gas for heating tar shall be secured to prevent falling.

d. Two (2) portable fire extinguishers shall be provided. Each extinguisher shall have a minimum rating of 10 BC. These extinguishers shall be fully charged and within fifteen (15) feet of the tar kettle during kettle operations.

1.9.2.13 Fire Hazards

For all potential fire hazards, call the Fire Department for assistance at 424-3886.

1.9.2.14 Emergency Phones

For actual emergencies not specifically covered in this guide, call 911 from Housing, or 911 from Base phones. Non-base phones need to call 707-424-4911

1.10 MAINTENANCE

During the construction period, all vegetation at the construction site and the storage area shall be maintained by the Contractor. Maintenance shall include mowing grass and/or weeds at least weekly. All damaged or dead vegetation shall be replaced as directed by the Contracting Officer at no additional cost to the Government.

1.11 HAZARDOUS WASTE CONTAINMENT AND DISPOSAL

1.11.1 Safety and Health Compliance

In addition to the minimum requirements of the Specifications, the Contractor shall comply with the laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting and disposing of hazardous waste materials. The Contractor shall comply with the applicable requirements of the current issue of 29 CFR 1910.1025. The Contractor shall submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. The Contractor shall make all required notifications and shall provide the Contracting Officer with a copy of same. Where specifications requirements and the referenced documents vary, the most stringent requirement shall apply. The following laws, ordinances, criteria, rules and regulations issued by the following agencies regarding removing, handling, storing, transporting, and disposing of hazardous waste apply. This list is not necessarily exhaustive:

a. U.S. Environmental Protective Agency Region IX
215 Fremont Street, A-3-3
San Francisco, CA 94105

b. Regional Water Quality Control Board
2101 Webster Street
Oakland, CA
Attn: Larry Kolb

c. Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

d. Solano County Department of Environmental Health Services
601 Texas Street
Fairfield, CA 94533
Attn: Mike Rees

e. California Environmental Protection Agency
Department of Toxic Substances Control
Region II
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2737

1.12 SPECIAL WORKING CONDITIONS AND WORK SCHEDULE

The following special working conditions and work schedule apply to the contract:

1.12.1 Street Closures and Traffic Control

a. All lanes of traffic shall remain open from 7:00 a.m. to 8:30 a.m. and from 3:30 p.m. to 5:30 p.m. Monday through Friday when utility cuts must be made. A minimum of one lane of traffic will be open in each direction from 8:30 a.m. to 3:30 p.m. Monday through Friday when utility cuts are made.

b. The Contractor shall provide all necessary signs, barricades, channelizing devices, markers and manpower to provide traffic

control when the work is in or near streets in accordance with the State of California Department of Transportation Standard Specifications (latest edition).

c. Any necessary detours shall be coordinated with the Contracting Officer at least 21 days before the detour is set up. Trenches shall not remain open for more than a period of 36 hours. Flaggers may be required to stop traffic intermittently as necessitated by work progress.

d. All truck traffic will use the south gate entering the base.

1.13 ENVIRONMENTAL MANAGEMENT

Conform to the requirements of Travis AFB, "Environmental Management Policy for Contractors and "Environmental Management Soil Handling Policy", in Appendix "B", conform to the Base Requirements for submittal of forms.

1.13.1 Contractor's Responsibilities for Regulatory Compliance

In the event that the Contractor, its employees, or agents fail to comply with applicable environmental laws or regulations, or otherwise engage in negligent or unlawful acts, which result in damage to the environment or enforcement against the Government by any enforcement agency, the Contractor shall be solely responsible for payment of, or reimbursement for, any and all costs, expenses, or other assessments against the Government resulting from such act or omission. Such costs and expenses include, but are not limited to, any fines, fees, or other punitive or civil assessments levied against the Government by state or federal enforcement agencies, or any expense otherwise directly or indirectly incurred by the government as a result or consequence of such acts or omissions of the Contractor, its agents, or its employees. In the event that the Contractor, its agents, or employees engage in such acts or omissions, and after receiving notice from the government to correct or otherwise repair, remove, or otherwise abate the effects of such actions or omissions, fails to expeditiously respond to such notice, the Contractor agrees to compensate and reimburse the Government for any and all costs incurred by the Government to repair, remove or otherwise abate such condition. The failure of the government to independently identify acts or omissions of the Contractor, which otherwise result in damage to the environment, shall not relieve the Contractor of his responsibilities under this paragraph.

1.13.2 Polychlorinated Biphenyls (PCBs)

The Contractor is responsible for properly managing PCBs and waste generated from PCB contaminated materials including light ballasts and transformers. Transformers will be tested for PCBs prior to disposal regardless of any labeling indicating "not containing" PCBs. Proper management includes but is not limited to handling, marking, labeling, packaging, transporting, and disposing of PCBs. When managing PCBs, the Contractor must follow federal, state, and local standards. The Code of Federal Regulations (CFR) outlines procedures for handling PCBs above 50 parts per million (ppm). California also regulates PCBs as hazardous waste above five ppm.

1.13.2.1 Requirements

Because the PBCs are an extremely toxic material, the Contractor shall ensure measures are in-place to prevent injury to personnel, accidental releases, and environmental contamination. Spilled material must be cleaned-up promptly and reported to EM. Waste PCB material cannot remain on-site for more than 90 days. While in storage, the Contractor shall comply with all applicable requirements that govern PCB hazardous waste management. A representative from EM must sign all manifests for PCBs destined for disposal. The Contractor must provide laboratory analysis for all manifested PCBs.

1.13.3 Waste/waste water discharges to storm, sanitary sewer systems and tower Area Removal Action (TARA) project

Conform to the following requirements for sanitary sewer discharges for groundwater discharge.

(1) Approval and fee payment to regulatory agency are required for ground water discharge to sanitary sewer system. The approval/regulatory agency is the Fairfield Suisun Sewer District (FSSD) phone (707) 429-8930.

(2) For each groundwater discharge approved by FSSD to Travis AFB's sanitary sewer system, the Contractor shall notify Base Environmental Management Office, prior to the discharge by sending:

a. Copy of disposal request including the analytical result.

b. Copy of discharge permit or copy of the invoice (quantity).

c. Point of discharge.

d. Date of discharge.

e. Regulator inspection time and date for wastewater discharge.

1.13.4 Waste Water Discharge

Conform to the following requirements:

(1) Prior approval of waste water discharges to the sanitary sewer system resulting from, construction/building maintenance activities, such as cleaning fuel pipelines, hydroblast operations or other short/one time discharge is required by Environmental Management Office.

(2) All wastewater discharges shall meet the FSSD Ordinance.

(3) The Contractor shall provide all equipment/treatment units such as filtration system, oil/water separator and similar equipment in treating the wastewater to meet FSD Ordinance.

(4) The Contractor shall provide documents and analytical reports to support characterization of the wastewater.

1.14 NON-STORM DISCHARGE

Following are requirements for non-storm water discharges into storm water system.

a. Groundwater Discharge

(1) A permit from the Regional Water Quality Control Board is required.

(2) A copy of the permit shall be sent to the Environmental Management Office.

b. For other water discharges

(1) Non-storm water discharges to the store drainage system as a result of construction activities, such as hydrotesting requires a permit. The regulating agency is:

California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612
Phone (510) 286-0846

(2) Dischargers shall obtain the permit and meet all permit requirements, such as analytical and permit fees.

(3) The discharge permit form may be obtained from the Environmental Management Office.

(4) All correspondence to regulating agencies shall be coordinated with EM prior to submittal to the agencies.

c. TARA; the Contractor shall obtain written approval from the installation Restoration Program Manager for all water discharges to the TARA project.

(1) Sources of Water allowed.

(a) Purging groundwater from monitoring wells.

(b) Decontamination activities associated with sampling at Travis Air Force Base.

(c) Small quantity of dewatering water, maximum 3000 gallons per day at 60 gallons per minute.

(2) Conditions for Discharging water

a. Point of contact is the Installation Restoration Program Manager, in Environmental Management.

b. Water with dissolved fuels and dissolved halogenated hydrocarbon solvents only. No free product (pure fuel, solvent, sheen) allowed.

c. No more than 1,000 gallons of water shall be added in any 5-hour period at a maximum flow of 60 gallons per minute.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

■ End of Section –

SECTION 01150

SPECIAL PROJECT PROCEDURES
08/04

PART 1 GENERAL

Not used.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 HAZARDS TO AIRFIELD OPERATION

In addition to "DFARS 252.236-7005, Airfield Safety Precautions," the following paragraphs apply.

3.1.1 Work in Proximity to Runways

All construction work on airfield areas may not begin until a temporary construction waiver has been approved by 60 AMW/CC. Accomplish all construction work on the taxiways and parking aprons and 75 feet to each side of the taxiway with extreme care regarding the operation of aircraft. Cooperate closely, and coordinate with the Operations Officer and the Contracting Officer. Park equipment in an area designated by the Contracting Officer. Under no circumstances shall equipment be parked overnight or for any extended period of time in the proximity of the runways or taxiways. Leave no material in areas where extreme care is to be taken regarding the operation of aircraft.

3.1.2 Schedule of Work/Aircraft Operating Schedules

Schedule work to conform to aircraft operating schedules. The Government will exert every effort to schedule aircraft operations so as to permit the maximum amount of time for the Contractor's activities; however, in the event of emergency, intense operational demands, adverse wind conditions, and other such unforeseen difficulties, the Contractor shall discontinue operations at the specified locations in the aircraft operational area for the safety of the Contractor and military personnel and Government property. Submit a schedule of the work to the Contracting Officer for transmittal to the Operations Officer describing the work to be accomplished; the location of the work, noting distances from the ends of runways, taxiways and buildings and other structures as necessary; and dates and hours during which the work is to be accomplished. Keep the approved schedule of work current, and notify the Contracting Officer of any changes prior to beginning each day's work.

3.1.3 Daytime Markings

During daylight, mark stationary and mobile equipment with international orange and white checkered flags, mark the material, and work with yellow flags.

3.1.4 Nighttime Markings

During nighttime, which begins 2 hours before sundown and ends 2 hours after sunrise, mark stationary and mobile equipment and material, and work with red lanterns. Where the Contracting Officer determines that the red lanterns may confuse pilots approaching for landings, the Contracting Officer may direct that the red lanterns be left off or that the color of the globes be changed.

3.1.5 Excavation

Open only those trenches for which material is on hand and ready for placing therein. As soon as possible after the material has been placed and work approved, backfill and compact the trenches as specified.

3.1.6 Contractor Safety Precautions

The contractor is advised that aircraft operations will produce extremely high noise levels and will induce vibrations in pavements, structures, and equipment in the vicinity, and may result in high velocity flying debris in the area. The contractor shall be responsible for providing all necessary ear protective and other safety devices for his personnel, for insuring protection of his equipment, and for scheduling the work to eliminate hazards to his personnel and equipment and to prevent damage to work performed by him.

3.1.7 Base Civil Engineering (BCE) Work Clearance Request

Obtain an approved BCE Work Clearance Request, AF Form 103, prior to the start of excavation, digging work, or work that disrupts aircraft or vehicular traffic flow, base utility services, fire and intrusion alarm system, or routine activities of the Activity.

3.1.8 Radio Contact

Provide necessary battery powered portable radios, including one radio for the tower. During work within the landing area, have an operator (who speaks fluent English) available for radio contact with the tower at all times. Radio frequency shall be approved by the tower.

-- End of Section --

SECTION 01200N

PRICE AND PAYMENT PROCEDURES
10/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP-1110-1-8	(2003) Construction Equipment Ownership and Operating Expense Schedule, Vol 1-12

1.2 CONTRACT MODIFICATIONS

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, equipment use rates shall be based upon the applicable provisions of the EP-1110-1-8.

1.3 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

1.3.1 Content of Invoice

Requests for payment will be processed in accordance with the Field pay estimate and must be completed by, the contractor and the engineering technician, prior to submission of the invoice. Contract Clause "FAR 52.232-27, Prompt Payment Construction Contracts."

a. The Contractor's invoice certified by QC, on the form furnished by the Government for this purpose, showing in summary form, the basis for arriving at the amount of the invoice. Submit original and five copies.

b. The Contract Performance Statement on the form furnished by the Government for this purpose, showing in detail, the estimated cost, percentage of completion, and value of completed performance. Submit original and two copies.

c. Final invoice shall be accompanied by Final Release Form. If the contractor is incorporated, the release shall contain the corporate seal. An officer of the corporation shall sign the release and the corporate secretary shall certify the release

d. Updated construction and equipment delivery schedules (two copies).

e. Contractor Safety Self Evaluation Checklist (original)

1.3.2 Mailing of Invoices

a. All invoices shall be forwarded with specific marking on the envelope. This marking shall be in the front lower left hand corner, in large letters, "INVOICES - ENCLOSED."

b. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies.

c. Final invoices not accompanied by Final Release Form will be considered incomplete and will be returned to the Contractor.

1.4 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

1.4.1 Obligation of Government Payments

The obligation of the Government to make payments required under the provisions of this contract will, at the discretion of the Contracting Officer, be subject to reductions and/or suspensions permitted under the FAR and agency regulations including the following in accordance with "FAR 32.503-6:

a. Reasonable deductions due to defects in material or workmanship;

b. Claims which the Government may have against the Contractor under or in connection with this contract;

c. Unless otherwise adjusted, repayment to the Government upon demand for overpayments made to the Contractor; and

d. Failure to provide up to date record drawings not current as stated in Contract Clause "FAC 5252.236-9310, Record Drawings."

1.4.2 Payment for Materials Offsite

Payments may be made to the Contractor for materials stored off construction sites under the following conditions:

a. Conditions described in the paragraph entitled "Payments to the Contractor";

b. Material within a distance of 50 miles by streets and roads to the construction site;

c. Materials adequately insured and protected from theft and exposure;

d. Materials not susceptible to deterioration or physical damage in storage or in transit to the job site are acceptable for

progress payments. Items such as steel, machinery, pipe and fittings, and electrical cable are acceptable; items such as gypsum wallboard, glass, insulation, and wall coverings are not;

e. Materials in transit to the job site or storage site are not acceptable for payment; and

f. Conditions specified in "FAR 52.232-5(b) Payments Under Fixed Price Construction Contracts."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01310

ADMINISTRATIVE REQUIREMENTS
01/05

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of contact personnel; G

1.2 MINIMUM INSURANCE REQUIREMENTS

Procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

a. Comprehensive general liability: $500,000 per occurrence

b. Automobile liability: $200,000 per person, $500,000 per occurrence for bodily injury, $20,000 per occurrence for property damage

c. Workmen's compensation as required by Federal and State workers' compensation and occupational disease laws.

d. Employer's liability coverage of $100,000, except in States where workers compensation may not be written by private carriers,

e. Others as required by the State of California.

1.3 CONTRACTOR PERSONNEL REQUIREMENTS

1.3.1 Subcontractors and Personnel

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.2 Identification Badges

Identification badges, if required, will be furnished without charge. Application for and use of badges will be as directed. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.3.3 Contractor Personnel Requirements

Failure to obtain entry approval will not affect the contract price or time of completion.

1.4 SUPERVISION

Have at least one qualified supervisor capable of reading, writing, and conversing fluently in the English language on the job site during working hours. In addition, if a Quality Control (QC) representative is required on the contract, then that individual shall also have fluent English communication skills.

1.5 AVAILABILITY OF CADD DRAWING FILES

After award and upon request, the electronic "Computer-Aided Drafting and Design (CADD)" drawing files will be made available to the Contractor for use in preparation of construction drawings and data related to the referenced contract subject to the following terms and conditions.

Data contained on these electronic files shall not be used for any purpose other than as a convenience in the preparation of construction drawings and data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor shall make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor shall, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CADD drawing files are not construction documents. Differences may exist between the CADD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CADD files, nor does it make representation to the compatibility of these files with the Contractors hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished CADD files, the signed and sealed construction documents shall govern. The Contractor is responsible for determining if any conflict exists. Use of these CADD files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project.

If the Contractor uses, duplicates and/or modifies these electronic CADD files for use in producing construction drawings and data related to this contract, all previous indicia of ownership (seals, logos, signatures, initials and dates) shall be removed.

1.6 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic

attachments in Microsoft, Adobe Acrobat, and other similar formats. Within 10 days after contract award, the Contractor shall provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple email address will not allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including field office(s). The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to this email address.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01321N

NETWORK ANALYSIS SCHEDULES (NAS)
08/04

PART 1 GENERAL

1.1 DESCRIPTION

The network analysis system shall consist of the network analysis schedule (diagram) and associated reports. The scheduling of all procurement and construction shall be the responsibility of the Contractor. Construction increments will be interrelated on a single schedule that represents the entire project duration from Contract Award to the Contract Completion Date. Schedule updates will build upon each other and will include construction increments as they are detailed, submitted and accepted. Submission of progress and revision data will be used to measure work progress, aid in the evaluation for requests for time extensions, and to provide the basis of all progress payments. The Critical Path Method (CPM) of network calculation shall be used to generate the project schedule and will utilize the Precedence Diagram Method (PDM) to satisfy both time and cost applications. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities.

For consistency, when scheduling software terminology is used in this specification, the terms in Primavera's scheduling programs are used. Primavera Project Planner, P3, Primavera Project Manager, SureTrak and PrimeContract are registered trademarks or service marks of Primavera Systems, Inc. Adobe and Acrobat are registered trademarks of Adobe Systems Incorporated.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualifications; G

Standard Activity ID Dictionary; G

Construction Network Analysis Schedule; G

Baseline Network Analysis Schedule; G

SD-07 Certificates

Monthly Network Analysis Updates; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.3 SCHEDULE ACCEPTANCE

Review comments made by the Government on the Contractor's schedule(s) will not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for scheduling, sequencing, and prosecuting the Work to comply with the requirements of the Contract Documents. Government acceptance extends only to the activities of the Contractor's schedule that the Government has been assigned responsibility and agrees it is responsible. The Government will also review for contract imposed schedule constraints and conformance, and cost loading of the CPM activities. Comments offered on other parts of the schedule, which the Contractor is assigned responsibility, are offered as a courtesy and are not conditions of Government acceptance; but are for the general conformance with established industry schedule concepts.

1.3.1 Schedule Acceptance Prior to Start of Work

The Baseline Network Analysis Schedule described in the paragraph entitled "Baseline Network Analysis Schedule" must be submitted and accepted by the Government before the Contractor will be allowed to start work on the construction stage(s) of the contract. Examples of construction stages are, but not limited to; demolition, site work, temporary work for construction, etc.

1.3.2 Acceptance

a. When the Construction Network Analysis Schedule is submitted and accepted by the Contracting Officer, it will then be considered the "Baseline Network Analysis Schedule". The Baseline Network Analysis Schedule will then be used by the Contractor for planning, organizing, and directing the work; reporting progress; and requesting payment for work accomplished. The schedule will be updated monthly by the Contractor and submitted monthly with the progress pay request to reflect the current status of the work. Submittal and acceptance of the Baseline Network Analysis Schedule and accurate updated schedules accompanying the pay requests are both conditions precedent to processing pay requests. Only bonds will be paid prior to acceptance of the Baseline Schedule(s).

b. Submittal of the Baseline Network, and subsequent schedule updates, will be understood to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor's plan on how the work will be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

1.4 SOFTWARE

The scheduling software that will be utilized by the Government on this project is SureTrak by Primavera Systems, Inc.. Notwithstanding any other provision in the contract, schedules submitted for this project must be prepared using either Primavera P3 or Primavera

SureTrak (files saved in Concentric P3 format). The Contractor shall provide electronic files saved in a format that is compatible with the Contracting Officer's current software version. Submission of data from another software system where data conversion techniques or software is used to import into Primavera's scheduling software is not acceptable and will be cause for rejection of the submitted schedule.

1.5 QUALIFICATIONS

The Contractor shall designate a Scheduler that will be responsible for the development, preparation, and maintenance of an accurate, computerized Network Analysis Schedule. The Scheduler shall have previously developed, created and maintained at least 2 previous computerized schedules of similar size and complexity of this contract. A resume outlining the qualifications of the Scheduler and their SureTrak or P3 training certificate from an authorized Primavera trainer shall be submitted for acceptance to the Contracting Officer. If at a later date, the Contracting Officer considers the Contractor's Scheduler to be incompetent or objectionable, the Contractor will propose a new Scheduler, meeting the qualification requirements. Payments will not be processed until an acceptable Scheduler is provided.

1.6 NETWORK SYSTEM FORMAT

The system shall consist of time scaled logic diagrams and specified reports.

1.6.1 Diagrams

Show the order and interdependence of activities and the sequence in which the work is planned to be accomplished. The basic concept of the network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and how its completion restricts or restrains the start of following activities. Activity durations shall not be resource-driven, activities shall start according to network logic and finish when its duration has elapsed. Diagrams shall be sorted by Early Start Date and will show a continuous flow from left to right with no logic (relationship lines) from right to left. With the exception of the Contract Award, Start Project and End Project milestone activities, no activities will be open-ended; each activity will have predecessor and successor ties. The diagram shall clearly show the activities of the critical path and must be red in color. Once an activity exists on the schedule it may not be deleted or renamed, and must remain in the logic. No more than 20 percent of the activities may be critical or near critical. Critical will be defined as having zero days of Total Float. "Near critical" will be defined as having Total Float in the range of 1 to 14 days. Show the following information on the diagrams for each activity:

a. Activity ID

b. Activity Description

c. Original Duration in Work Days

d. Remaining duration

e. Actual Duration in Work Days

f. Early Start Date

g. Early Finish Date

h. Total Float

Provide network diagrams on tabloid (11X17) sheets. Updated diagrams shall show the date of the latest revision.

1.6.2 Schedule Activity Properties and Level of Detail

Numbering shall be assigned so that, in general, predecessor activity numbers are smaller numerically than the successor activity numbers. Skip numbering shall be used on the network to allow insertion of additional activities for contract modifications and logic changes. The minimum number of construction activities in the final network diagram shall be 30. Activity categories included in the schedule are specified below.

1.6.2.1 Activity Categories

a. Procurement Activities: Tasks related to the procurement of material or equipment shall be included as separate activities in the project schedule. Examples of procurement activities include, but are not limited to; Material/equipment submittal preparation, submittal and approval of material/equipment; delivery of O&M manuals; material/equipment fabrication and delivery, delivery of extra parts, extra stock, special tools, notification of Government Furnished Material/Equipment delivery requirement, etc. As a minimum, separate procurement activities will be provided for every specification section. If the Contractor intends on using Just-In-Time (JIT) delivery methods, the schedule will show each JIT delivery with relationship tie to the Construction Activity specifically for the JIT delivery. Material and equipment for which payment will be requested in advance of installation shall be cost-loaded with the procurement costs (e.g.; the delivery milestone(s)). All activities within a procurement process/cycle will have a unique identifier in the activity code to show their relationships and will extend to the related construction activities (i.e., CSI Code).

If the Government's action on any submittal is "Disapproved" or "Revise and Resubmit", a new series of Procurement Activities will be inserted into the schedule. Predecessor for the new submittal preparation activity will be the original approval activity and the successor of the new approval activity will be the fabrication/deliver activity for the equipment or material.

b. Government Activities: Government and other agency activities that could impact progress shall be clearly

identified. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted inspections/tests, environmental permit approvals by State regulators, utility outages, Notice(s) to Proceed and delivery of Government Furnished Material/Equipment. Show activities indicating Government furnished materials and equipment utilizing delivery dates indicated in "FAR 52.245-2, Government Property (Fixed-Price Contracts)." Government activities will be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

c. Construction Quality Management (CQM) Activities: CQM Activities will identify the Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan. These activities will be added to each 3-Week Look Ahead Schedule referenced in the paragraph entitled "THREE-WEEK LOOK AHEAD SCHEDULE" and will also be included in each monthly update referenced in the paragraph entitled "Monthly Network Analysis Updates". The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.

d. Construction Activities: Construction activities shall include, but are not limited to: Tasks related to mobilization or demobilization; the installation of temporary or permanent work by tradesman; testing and inspections of installed work by technicians, inspectors or engineers; start-up and testing of equipment; commissioning of building and related systems; scheduling of specified manufacture's representatives; Punch Out Inspection; Pre-Final Inspection, Final Acceptance Inspection; final clean-up; training to be provided; and administrative tasks necessary to start, proceed with, accomplish or finalize the contract. No onsite construction activity shall have a duration in excess of 20 working days. Contractor activities will be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

1.6.2.2 Project Milestones

Dates shall be shown on the diagram for the start of the project, any contract required interim start and completion dates, contract completion date and other significant milestones.

a. Project Start Date Milestones: The schedule shall start no earlier than the Contract Award Date and the project duration (Day 1) will start on the Notice-to-Proceed (NTP) date. The Contractor shall include as the first milestone in the schedule, an activity named "Contract Award". Another milestone shall be included that will be named "Start Project". The Contract Award and Project Start milestones shall have mandatory start constraint dates equal to the Contract Award and NTP dates, respectively.

b. Constraint of Last Activity Milestone: The Contractor shall include as the last activity in the project schedule, an

activity named "End Project". The "End Project" activity shall have a mandatory finish constraint equal to the contract completion date for the project. Calculation of project updates shall be such that if the finish of the last activity falls after the contract completion date, then the float calculation shall reflect negative float on the critical path and if the finish of the last activity falls before the contract completion date, the float calculation shall reflect positive float on the critical path. The only predecessor activity to this activity will be either the "Contractor Early Completion" or the "Substantial Completion" milestone, whichever is used by the Contractor.

c. Early Project Completion: In the event the Contractor's project schedule shows completion of the project prior to the contract completion date, the Contractor shall include an activity named "Contractor Early Completion". The activity shall be a milestone with an unconstrained date representing the Contractor's Early Completion date. The only successor activity to this activity will be the "End Project" milestone.

d. Substantial Completion: If the Contractor elects to include an activity for Substantial Completion, then it is agreed that Substantial Completion will be the point in time that the Government considers the project is complete and ready for its intended use. The activity will be named "Substantial Completion". The activity shall be a milestone with an unconstrained date representing the Contractor's Substantial Completion date. The only successor activity to this activity will be the "End Project" milestone.

e. Phase Start Milestone: The Contractor shall include as the first activity for a project phase, an activity named "Start Phase X", where "X" identifies the phase of work. The "Start Phase X" activity shall have an unconstrained start date equal to the date of the Phase NTP. This unconstrained start date is not a release from contractually required start dates, but is left unconstrained to allow the schedule logic to calculate without hindrance.

f. End Phase Milestone: The Contractor shall include as the last activity in a project phase, an activity named "End Phase X" where "X" identifies the phase of work. The "End Phase X" activity shall have an unconstrained late finish date equal to the contract phase completion date. This unconstrained completion date is not a release from contractually required finish dates, but is left unconstrained to allow the schedule logic to calculate without hindrance.

g. Early Phase Completion: If the Contractor expects to finish prior to the contract phase completion date, the milestone will show an early finish date equal to the Contractor's early finish date. The name of the activity will be "Early Phase Completion" and will have an unconstrained date representing the Contractor's early phase completion date.

1.6.2.3 Activity Identification (ID) and Description

a. Standard Activity ID Dictionary: The Contractor shall submit the alphanumeric coding scheme for Schedule Activity Numbers that shall be used throughout the project. The coding scheme submitted shall list the values for each activity code and translate those values into project specific designations. Code length shall not exceed 10 characters. Once accepted, the coding scheme will be used for the duration of the project.

b. Activity Description: Each activity shall have a narrative description consisting of a Verb or work function (e.g.; form, pour, excavate), an Object (e.g.; slab, footing, under floor plumbing), and Area (e.g.; 3rd floor, northeast quadrant, basement).

1.6.2.4 Activity Code Dictionary and Values

The Contractor shall establish the activity codes identified in this specification. The codes will have values assigned that will allow the scheduling program to sort, select, group and organize the activities in the schedule. Activity codes include, but are not limited to, the following codes:

a. Phase Code: If phasing is specified in the contract, all activities shall be identified in the project schedule by the Phase Code in which the activity occurs. Activities shall not be contained in more than one Phase.

b. Area Code: All activities shall be identified in the project schedule by the Area Code in which the activity occurs. Activities shall not be contained in more than one Area Code. Area is defined as distinct separations in construction, such as a story of construction, separate structure, usage or function difference, utility distribution systems, etc.

c. Responsibility Code: All activities in the project schedule shall be identified with the party responsible to perform the task. Responsibility includes, but is not limited to; the Prime Contractor, subcontracting firm, or Government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by a responsibility code. For example, a responsibility code value, "ELEC", may be used to identify the "Electrical Subcontractor".

d. CSI Code: All activities in the project schedule shall be identified with its respective 5-digit Specification Section number. Activities shall not belong to more than one Section number. If an activity does not have an applicable CSI Code, (such as "Mobilize"), the code will be "00000".

e. Drawing Code: All activities in the project schedule shall be identified with its respective project Drawing Code. The Drawing Code is the Sheet Number on the primary project

drawing, which indicates the work to be performed. Activities shall not belong to more than one Drawing Code. Examples of Drawing Codes are "C-10", "C.10" or "C10". The code system will allow organizing all activities by Drawing Code in alpha and numeric order. If an activity does not have an applicable Drawing Code, (such as "Mobilize"), the code will be "00000".

f. Modification Code: The Modification Code shall identify activities that are modified or added by contract modification. Activities shall not belong to more than one Modification Code. The Government will assign the modification number, which will be shown on the Standard Form 30. Use a shortened version of the modification number for the code (e.g.; A00010 = 010).

g. Request for Equitable Adjustment (REA) or Claim Code: Activities that are modified or added, as a result of a Contractor's REA or Claim shall be identified by a code generated by the Contractor. Activities shall not belong to more than one REA or Claim Code.

1.6.2.5 Cost and Resource Loading

a. Cost Loading Activities: Equipment costs will be assigned to their respective Procurement Activities (i.e., the delivery milestone activity). Costs for installation of the material/equipment (labor, construction equipment, and temporary materials) will be assigned to their respective Construction Activities. The value of inspection/testing activities will not be less than 10 percent of the total costs for Procurement and Construction Activities. Evenly disperse overhead and profit to each activity over the duration of the project. The total of all cost loaded activities; including costs for material and equipment delivered for installation on the project, and labor and construction equipment loaded construction activities, shall total to 100 percent of the value of the contract.

b. Quantities and Units of Measure: Each cost loaded activity will have a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, etc. These entries are informational only and are non-calculating. Quantities shall be entered as Log Text 1 (in SureTrak) or Log 1 (in P3) for each activity, column heading will be "Quantities". Units of Measure shall be entered as Log Text 2 (in SureTrak) or Log 2 (in P3) for each activity, column heading will be "Units of Measure".

1.6.2.6 Anticipated Weather Delays

Schedule activity duration(s) shall be formulated with allowance for normal adverse weather conditions. Any activity duration, which could be impacted by normally anticipated adverse weather (precipitation, high or low temperature, wind, etc.), due to the time period that the Contractor has scheduled the work, shall include an adjustment to include the anticipated weather delay. The Contractor shall

anticipate delay by comparing the contractually imposed environmental restrictions in the Contract Documents to the National Oceanic and Atmospheric Association's (NOAA) historical monthly averages for the NOAA location closest to the project site. The number of anticipated adverse weather delays allocated to an activity will be reflected in the activity's calendar. A lost workday, due to weather conditions, is defined as a day in which the Contractor's workforce cannot work 50 percent or more of the day on the impacted activity(s). The Contractor shall immediately notify the Contracting Officer when a lost day has occurred due to weather, will record on the Daily Reports the occurrence of adverse weather and resultant impact to the normally scheduled work. If the number of actual adverse weather delay days exceeds the number of days anticipated, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days and issue a modification in accordance with the contract clauses.

1.6.2.7 Schedule Software Settings and Restrictions

a. Activity Constraints: Date/time constraint(s), other than those required by the contract, will not be allowed unless accepted by the Contracting Officer. Contractor will identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.

b. Lags: Lags will not be used when the creation of an activity will perform the same function (e.g., concrete cure time). Lag durations contained in the project schedule shall not have a negative value. Contractor will identify any lag proposed and provide an explanation for the purpose of the lag in the Narrative Report.

c. Default Progress Data Disallowed: Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates on the CPM schedule shall match the dates provided from Contractor Quality Control and Production Reports. These reports will be the sole basis for updating the schedule. Work activities will be updated by actual work progression rather than being cash flow driven. Actual labor and equipment hours used on activities will be derived from the Daily Reports.

d. Software Settings: If the contractor chooses to use Primavera's SureTrak software, the Autocost Rules shall be set to:
   1) Uncheck - Link Remaining Duration and Schedule Percent Complete;
   2) Check - Use Updated Percent Complete Against Budget to Estimate Actual to Date;
   3) Check - Freeze Resource Units per Hour When Quantities Change;
   4) Check - Update Cost and Revenue Information; and,
   5) Set Resource Data to "Two decimal places".

If the contractor chooses to use Primavera's P3 software, the AutoCost rules shall be set as shown below, all others shall

be deactivated (i.e.; check boxes and radio buttons not filled in):

1) Use the update percent complete against budget to estimate:
   Actual cost to date.
2) Link budget and EAC for non-progressed activities:
   Budget-EAC.
3) Perform these calculations during each schedule computation: Apply these rules when moving from one Resource to another.

Schedule calculations and Out-of-Sequence progress (if applicable) shall be handled through Retained Logic, not Progress Override. All activity durations and float values will be shown in days, time will not be shown in the duration display. Activity progress will be shown using Remaining Duration. Date format will be DDMMMYY (i.e., 11DEC02). Default activity type will be set to "Task".

1.6.3 Required Tabular Reports

The following reports will be based on the information in the paragraph entitled "Diagrams" and included with the schedule submittals and in each updated schedule submission provided on disk by the Contractor:

a. Earned Value Report: Listing all activities having a budget amount and cost. A compilation of total earnings on the project from the notice to proceed to the most recent monthly progress payment request and the difference between the previous request amount and the current payment request amount. Sort report first by resource and then by activity.

b. Log Report: With each updated schedule submission, provide a computer generated Log Report using a recognized schedule comparison software listing all changes made between the previous schedule and current updated schedule. Identify the name of the previous schedule and name of the current schedule being compared. This report will as a minimum show changes for: Added & Deleted Activities, Original Durations, Remaining Durations, Activity Percent Complete, Total Float, Free Float, Calendars, Descriptions, Constraints (added, deleted or changed), Actual Starts/Finishes, Added/Deleted Resources, Resource Quantities, Costs, Resource Percents, Added/Deleted Relations, Changed Relation Lags, Changed Driving Relations, and Changed Critical Status.

c. Activity ID Report: By activity number in ascending order showing the current status of all activities.

d. Total Float Report: List of all activities by total float in ascending order and then in order of early start date.

e. Early Start Report: By earliest allowable start dates and then in order of activity number.

f. 30-Day Look Ahead: Activities in progress or scheduled to start or finish within the next 30 calendar days of the project Data Date or is continuing through the 30 day period.

1.7 SUBMISSION AND ACCEPTANCE

1.7.1 Preliminary Meeting

Prior to the preparation of the Construction Network Analysis Schedule for acceptance; the Contracting Officer, Contractor and the scheduler shall participate in a preliminary meeting to discuss the proposed schedule and requirements of this section prior to submission of the network. Discussions shall include: 1) Which construction activities may have delivered material costs included (e.g., concrete placement, etc.), 2) Which procurement activities will have material/equipment costs separated from their respective construction activity costs (e.g., any stored equipment, etc.) and, 3) Which procurement and construction activities will have separate testing/inspection costs; per the paragraph entitled "Cost Loading Activities".

1.7.2 Construction Network Analysis Schedule

Submit the complete network analysis schedule and obtain acceptance prior to starting construction work. Submit three copies of the diagrams described in the paragraph entitled "Diagrams" and the reports listed in the paragraph entitled "Required Tabular Reports". As part of this submittal, provide the Project Name format (and Project Group Name if used) that will be used by the Contractor to identify initial schedule submittals, updates, fragnets, changes, etc. Backed-up native files (.prx or .stx) for the schedule submittal will be posted to the NAVFAC WebCM internet site, as directed by the Contracting Officer. The project schedule will also be posted in the format specified as an Adobe PDF file with no relationship lines displayed in the graphic.

1.7.3 Review and Evaluation

After the Government's review(s) of the Construction Network Analysis Schedule, the Contractor shall meet with the Contracting Officer to discuss the review and evaluation of the NAS submittal. Revisions necessary as a result of this review shall be resubmitted for acceptance within 10 calendar days after the meeting.

1.7.4 Baseline Network Analysis Schedule

Once review comments are resolved and the Contracting Officer has accepted the Construction Network Analysis Schedule, the Contractor shall within 5 calendar days furnish:

a. Two copies of the network diagrams.

b. Two copies of the reports listed in paragraph entitled "Required Tabular Reports".

c. Two copies of the Cash Flow S-Curve indicating the cash flow based upon both the projected early and late finish dates.

d. Two sets of data disks containing the project schedule shall be provided for the each Baseline submission and every periodic project update. Backed-up native files (.prx or .stx) for the schedule submittal will be posted to the NAVFAC WebCM internet site, as directed by the Contracting Officer. The project schedule will also be posted in the format specified as an Adobe PDF file with no relationship lines displayed in the graphic. Data shall be submitted on electronic media that is acceptable to the Contracting Officer. A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Construction NAS, Baseline, Update, Recovery, Time Impact Analysis (PC#), etc.), full contract number, Project Name used to identify project in scheduling software, contract name & location, data status date, diskette number with total number of diskettes in set, software name and version used to run the schedule, and the name and telephone number of person responsible for the schedule.

For major revisions, updates or changes to the network diagrams, once accepted by the Contracting Officer, the Contractor shall submit these same diagrams and reports.

1.7.5 Monthly Network Analysis Updates

At monthly intervals the Contractor and Government representatives will meet to jointly update the project schedule and agree on percentage of payment for each activity progressed during the update period. The purpose of the meeting is to determine progress payment amounts for each activity, allow all parties to evaluate project status at the data date, provide a complete and accurate update of procurement and construction progress, create an historical record of the project and establish prediction of completion date(s) based upon current status. The Contractor is responsible to gather all supporting documentation, present the update data for the schedule and record the meeting minutes. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities. Submit at monthly intervals a report of the actual construction progress by updating the required reports and the time scaled logic diagram. Meeting to update the schedule and the submission of an error free, acceptable updated schedule to the Government is a condition precedent to the processing of the Contractor's pay request. As a minimum, the following actions will be accomplished during the meeting:

a. Identify activities started and completed during the previous period and enter the Actual Start and Actual Finish dates. It will be understood that Actual Start is defined as the date that work begins on an activity with the intent to pursue the work represented by the activity to substantial completion, and Actual Finish is defined as the date that the activity's work is substantially complete to the point that its successor activity(s) may begin.

b. Show estimated duration (in workdays) to complete each activity started but not completed (remaining duration).

c. Indicate percentage of cost payable and percent of work complete as separate and independent entries for each activity. The assignment of an Actual Finish date to an activity does not imply that the activity's percent of payment will be statused to 100%.

d. Reflect changes in the network diagram. All changes (i.e., remaining duration changes, logic changes, new logic, conformed change orders, new activities, changes due to Conformed Modifications, changes in work sequence, entry of as-built relationship logic, etc.) shall be recorded and a note added to the activity log field. The log shall include as a minimum, the date and reason for the change, and description of the change.

e. Submit two copies of a Narrative Report describing: 1) Progress made in each area of the project; 2) Changes in the following; activities, original durations, logic interdependencies, milestones, planned sequence of operations, critical path, and resource and loading; 3) Pending items and status thereof, including permits, change orders, and time extensions; 4) Status of Contract Completion Date and interim milestones; 5) Current and anticipated delays (describe cause of the delay and corrective action(s)); and 6) Description of current and future schedule problem areas. Each entry in the narrative report will cite the respective Activity ID and Activity Description.

f. Submit two copies of the reports listed in paragraph entitled "Required Tabular Reports".

g. Two hard copies of the network diagrams and two sets of data disks.

h. Submit two copies of the Update Meeting minutes.

1.7.6 As-Built Schedule

As a condition precedent to the release of retention and making final payment, the Contractor shall submit an "As-Built Schedule", which is the last schedule update. The As-Built Schedule shall reflect the exact manner in which the project was actually constructed (including actual start and finish dates, activities, sequences, and logic) and shall be certified by the Contractor's Project Manager and Construction Scheduler as being a true reflection of the way the project was actually constructed. If more than one person filled the position(s) during the course of the project, each person will provide certification for the period of time they were responsible.

1.8 CONTRACT MODIFICATION

When a contract modification to the work is required, submit proposed revisions to the network with a fragnet and a cost proposal for each proposed change. All modifications shall be incorporated into the network analysis system as separate identifiable activities broken down and inserted appropriately on the first update following issuance of a directive to proceed with the change. Submit two copies of the

Total Float Report, Log Report and a copy of the proposed Time Impact Analysis on disk, with the cost proposal. Unless the Contracting Officer requests otherwise, only conformed contract modification fragnets will be added into the subsequent monthly updates. All revisions to the current baseline schedule activities that are necessary to further refine the schedule so that the changed work activities can be logically tied to the schedule shall be made. Financial data shall not be incorporated into the schedule until the Contracting Officer signs the contract modification.

1.8.1 Time Impact Analysis:

The Time Impact Analysis method shall be used by the Contracting Officer and Contractor in determining if a time extension or reduction to the contract milestone date(s) is justified. The Contractor shall provide a Time Impact Analysis to the Contracting Officer for any proposed contract change or as support for a Value Engineering Proposal, Variance Request, Claim or Request for Equitable Adjustment by the Contractor. Submit the Time Impact Analysis schedule, reports, etc. on disk and as a printed/plotted hardcopy.

a. The Contractor shall submit a Time Impact Analysis (TIA) illustrating the influence of each change or delay on the Contract Completion Date or milestones. Unless the Contracting Officer requests an interim update to the schedule, the current monthly updated schedule accepted by the Government shall be used to display the impacts of the change. Unless requested by the Contracting Officer, no other non-conformed changes will be incorporated into the schedule being used to justify the change impact.

b. Each TIA shall include a Fragmentary Network (fragnet) demonstrating how the Contractor proposes to incorporate the impact into the project schedule. A fragnet is defined as the sequence of new activities and/or activity revisions, logic relationships and resource changes that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Contractor shall provide a hardcopy printout of the fragnet activities and relationships being added and also insert the fragnet into the most current, accepted Monthly Network Analysis Update, run the schedule calculations and submit the impacted schedule with the proposal, claim, etc. Include a narrative report describing the effects of new activities and relationships to interim and contract completion dates, with each TIA. Submit time extension requests with a Time Impact Analysis and three hardcopies of the fragnet (in a graphic format), impacted schedule (with fragnet loaded), Total Float Report, Narrative Report and Log Report.

c. Following the Contractor's receipt of a contract modification on a Standard Form 30 signed by the Government; all changes in the fragnet used to determine impacts, shall be incorporated into the schedule. Changes to the schedule will occur during the next monthly schedule update meeting.

1.8.2 No Reservation-Of-Rights

All direct costs, indirect costs, and time extensions will be negotiated and made full, equitable and final at the time of modification issuance.

1.9 CHANGES TO THE NETWORK ANALYSIS SCHEDULE

If changes in the method of operating and scheduling are desired, the Contracting Officer shall be notified in writing stating the reasons for the change. If the Contracting Officer considers these changes to be of a major nature, the Contractor may be required to revise and submit for acceptance, without additional cost to the Government, the network diagrams and required reports. A change may be considered of a major nature if the estimated time required or actually used for an activity or the network logic has varied from the original plan to a degree that there is a reasonable doubt as to the effect on the contract completion date(s) or phase completion dates. Changes that affect activities with adequate float time shall be considered a major change when their cumulative effect could extend the contract completion date.

1.10 FLOAT

Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to Government caused delay), lag logic restraints, zero total or free float constraints, extended activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

1.10.1 Definitions of Float

Free Float is the length of time the start of an activity can be delayed without delaying the start of a successor activity. Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the project completion date. Project Float is the length of time between the Contractor's Early Completion (or Substantial Completion or similar activity) and the Contract Completion Date.

1.10.2 Ownership of Float

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Government or the Contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the reserve of float. A schedule showing work completing in less time than the Contract time, and accepted by the Government, will be

considered to have Project Float. Project Float will be a resource available to both the Government and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the Project's critical path, consumes all available float or contingency time, and extends the work beyond the Contract Completion Date.

1.10.3 Negative Float

Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the paragraphs entitled "CONTRACT MODIFICATION". Scheduled completion date(s) that extend beyond the contract or phase completion date(s) (evidenced by negative float) may be used in computations for assessment of payment withholdings. The use of this computation is not to be construed as a means of acceleration.

1.11 THREE-WEEK LOOK AHEAD SCHEDULE

To provide a more detailed day-to-day planning of upcoming construction work, the Contractor shall prepare and issue detailed work plans that coordinate with and supplement the above defined network analysis. The work plans shall be keyed to the CPM activity numbers and shall be submitted each week and shall show the project activities that will occur during the current and following two-week interval. Additionally, the critical path activities are to be identified on the 3-Week Look Ahead Schedule. The schedule will be a bar chart type schedule prepared by the Contractor in sufficient detail to define the work to be accomplished, the crews, construction tools and equipment to be used during the current and next two-week interval. The bar charts shall be formatted to allow reproduction on 8 1/2 by 11 sheets. Three copies of the bar chart schedules shall be delivered to the Contracting Officer not less than 3 work hours prior to the start of the weekly coordination meeting.

1.12 WEEKLY COORDINATION MEETING

In conjunction with the receipt of the 3-Week Look Ahead Schedule, a coordination meeting will be held each week in the Contracting Officer's conference room to discuss the work schedule. The Contractor shall make a presentation of the previously submitted and current 3-Week Look Ahead Schedule to the Contracting Officer so as to provide an overview of the project's schedule and provide an opportunity to discuss items of coordination. Consideration of materials, crews, and equipment shall be addressed to ascertain their respective availability. The meeting shall identify actions necessary to provide adherence to the 3-Week Look Ahead Schedule and the overall network for the project defined above. The Contractor will take meeting minutes. All meeting minute entries will be keyed to the schedule activity number(s) being addressed. Within one day of the meeting, the Contractor will provide a draft copy of the meeting minutes to the Contracting Officer for review and comment. Final copies of the minutes containing the comments provided by the Contracting Officer will be issued within 3 days of the meeting.

1.13 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs, etc.) shall reference the Schedule Activity Number(s) that are being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure, etc.) shall reference the Schedule Activity Number(s) that are being addressed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES
01/06

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Submittal

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.1.2 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

SD-01 Preconstruction Submittals

Certificates of insurance.
Surety bonds.
List of proposed subcontractors.
List of proposed products.
Construction Progress Schedule.
Submittal register.
Schedule of prices.
Health and safety plan.
Work plan.
Quality control plan.
Environmental protection plan.

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

1.1.3 Approving Authority

Office or designated person authorized to approve submittal.

1.1.4 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submittal register; G

1.3 USE OF SUBMITTAL REGISTER DATABASE

Submittal register database and submittal management program will be delivered to the Contractor, by Contracting Officer. Register database will have the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal. A "G" indicates approval by Contracting Officer; a blank indicates approval by QC manager.

The database and submittal management program will be extractable from the disk furnished to Contractor, for operation on Contractor's IBM compatible personal computer with 640kb RAM, a hard drive, and 3 1/2 inch high density floppy disk drive.

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved.

1.3.1 Submittal Register

Submit submittal register as an electronic database, using submittals management program furnished to Contractor. Submit with quality control plan and project schedule required by Section 01450N CONSTRUCTION QUALITY CONTROL and Section 01321N NETWORK ANALYSIS SCHEDULES (NAS). Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register database:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.3.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.3.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to Contractor.

1.3.4 Contractor Action Code and Action Code

Entries used shall be as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.3.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request. Deliver in electronic format, unless a paper copy is requested by Contracting Officer.

1.4 PROCEDURES FOR SUBMITTALS

1.4.1 Reviewing, Certifying, Approving Authority

QC organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates Contracting Officer is approving authority for that submittal item.

1.4.2 Constraints

a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.

b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.

c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.4.3 Scheduling

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.

b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer approval begins when Government receives submittal from QC organization. Period of review for each resubmittal is the same as for initial submittal.

c. For submittals requiring review by fire protection engineer, allow review period, beginning when Government receives submittal from QC organization, of 30 working days for return of submittal to the Contractor. Period of review for each resubmittal is the same as for initial submittal.

1.4.4 Variations

Variations from contract requirements require Government approval pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to Government.

1.4.4.1 Considering Variations

Discussion with Contracting Officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

1.4.4.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.4.4.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.4.4.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.4.5 Contractor's Responsibilities

a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

b. Transmit submittals to QC organization in accordance with schedule on approved Submittal Register, and to prevent delays in the work, delays to Government, or delays to separate Contractors.

c. Advise Contracting Officer of variation, as required by paragraph entitled "Variations."

d. Correct and resubmit submittal as directed by approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the Contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.

e. Furnish additional copies of submittal when requested by Contracting Officer, to a limit of 20 copies per submittal.

f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.

g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.

1.4.6 QC Organization Responsibilities

a. Note date on which submittal was received from Contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

d. Act on submittals, determining appropriate action based on QC organization's review of submittal.

(1) When QC manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."

(2) When Contracting Officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

e. Ensure that material is clearly legible.

f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is Contracting Officer, QC organization will certify submittals forwarded to Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number N62473-06-C-8011, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

(2) When approving authority is QC Manager, QC Manager will use the following approval statement when returning submittals to Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number N62473-06-C-8011, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

g. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

h. Update submittal register database as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Contracting Officer.

i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

1.4.7 Government's Responsibilities

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received from QC manager, on each submittal for which the Contracting Officer is approving authority.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph entitled "Actions Possible" and with markings appropriate for action indicated.

1.4.8 Actions Possible

Submittals will be returned with one of the following notations:

a. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required , does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

b. Submittals marked "approved" "approved as submitted" authorize Contractor to proceed with work covered.

c. Submittals marked "approved as noted" or "approval except as noted; resubmission not required" authorize Contractor to proceed with work as noted provided Contractor takes no exception to the notations.

d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.5 FORMAT OF SUBMITTALS

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels, to office of approving authority. Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. The transmittal form shall identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

1.5.2 Identifying Submittals

Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Section number of the specification section by which submittal is required.

d. Submittal description (SD) number of each component of submittal.

e. When a resubmission, add alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.

f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal.

g. Product identification and location in project.

1.5.3 Format for SD-02 Shop Drawings

a. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 30 by 42 inches.

b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."

d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

e. Drawings shall include the nameplate data, size and capacity. Also include applicable federal, military, industry and technical society publication references.

1.5.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instruction

a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.

d. Product data shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for SD-07 Certificates.

e. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

f. Submit manufacturer's instruction prior to installation.

1.5.5 Format of SD-04 Samples

a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

(1) Sample of Equipment or Device: Full size.

(2) Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

(3) Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

(4) Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

(5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 2 by 4 inches.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: 100 square feet.

b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use.

d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

1.5.6 Format of SD-05 Design Data and SD-07 Certificates

a. Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.5.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

a. Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.

b. Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

1.5.8 Format of SD-10 Operation and Maintenance Data (O&M)

a. Not required for this project

1.5.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

a. When submittal includes a document which is to be used in project or become part of project record, other than as a

submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

a. Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.6.4 Number of Copies SD-05 Design Data and SD-07 Certificates

a. Submit in compliance with quantity requirements specified for shop drawings.

1.6.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

a. Submit in compliance with quantity with quality requirements specified for shop drawings.

1.6.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit Five copies of O&M Data to the Contracting Officer for review and approval.

1.6.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

a. Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for shop drawings.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS
06/05

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ACI INTERNATIONAL (ACI)
P.O. Box 9094
Farmington Hills, MI 48333-9094
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: http://www.aci-int.org

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
444 North Capital Street, NW, Suite 249
Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aashto.org
Internet: http://www.aashto.org

AMERICAN HARDBOARD ASSOCIATION (AHA)
c/o Composite Panel Association
18922 Premiere Court
Gaithersburg, MD 20879-1574
Ph: 301-670-0604
Fax: 301-840-1252
Internet: http://www.pbmdf.org

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor

Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: http://www.ansi.org/
--- ANSI documents beginning with the letter "S" can be ordered from:

Acoustical Society of America (ASA)
2 Huntington Quadrangle, Suite 1NO1
Melville, NY 11747-4502
Ph: 516-576-2360
Fax: 516-576-2377
E-mail: asa@aip.org
Internet: http://asa.aip.org

AMERICAN WATER WORKS ASSOCIATION(AWWA)
6666 West Quincy Avenue
Denver, CO 80235
Ph: 303-794-7711
Fax: 303-347-0804
Internet: http://www.awwa.org

ASME INTERNATIONAL (ASME)
Three Park Avenue
New York, NY 10016-5990
Ph: 212-591-7722
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: http://www.asme.org

ASPHALT INSTITUTE (AI)
Research Park Drive
P.O. Box 14052
Lexington, KY 40512-4052
Ph: 859-288-4960
Fax: 859-288-4999
E-mail: webmaster@asphaltinstitute.org
Internet: http://www.asphaltinstitute.org

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: http://www.astm.org

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)
University of South California
Kaprielian Hall 200
Los Angeles, CA 90089-2531
Ph: 213-740-2032
Fax: 213-740-8399
E-mail: fccchr@usc.edu
Internet: http://www.usc.edu/dept/fccchr

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Lane
Piscataway, NJ 08855-1331
Ph: 732-981-0060
Fax: 732-981-1712
E-mail: customer-services@ieee.org
Internet: http://www.ieee.org

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)
P.O. Box 687
106 Stone Street
Morrison, CO 80465
Ph: 303-697-8441
Fax: 303-697-8431
E-mail: neta@netaworld.org
Internet: http://www.netaworld.org

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-5900
E-mail: webmaster@nema.org
Internet: http://www.nema.org/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: http://www.nfpa.org

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)
900 Spring Street
Silver Spring, MD 20910
Ph: 301-587-1400
Fax: 301-585-4219
Internet: http://www.nrmca.org

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CDT)
Publication Distribution Unit
1900 Royal Oaks Dr.
Sacramento, CA 95815-3800
Ph: 916-445-3520
Fax: 916-324-8997
E-mail: publications@dot.ca.gov
Internet: http://www.dot.ca.gov

UNDERWRITERS LABORATORIES (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096
Ph: 847-272-8800
Fax: 847-272-8129
E-mail: northbrook@us.ul.com
Internet: http://www.ul.com/

U.S. ARMY CORPS OF ENGINEERS (USACE)
Order CRD-C DOCUMENTS from:
U.S. Army Engineer Waterways Experiment Station
ATTN: Technical Report Distribution Section, Services Branch, TIC
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
Ph: 601-634-2664
Fax: 601-634-2388
E-mail: mtc-info@erdc.usace.army.mil
Internet: http://www.wes.army.mil/SL/MTC/handbook.htm
Order Other Documents from:
USACE Publications Depot
Attn: CEIM-IM-PD
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: http://www.usace.army.mil/publications
or http://www.hnd.usace.army.mil/techinfo/engpubs.htm

U.S. DEPARTMENT OF COMMERCE (DOC)
1401 Constitution Avenue, NW
Washington, DC 20230
Ph: 202-482-4883
Internet: http://www.commerce.gov/
Order Publications From:
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Ph: 703-605-6585
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Ph: 202-272-0167
Internet: http://www.epa.gov
--- Some EPA documents are available only from:
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Ph: 703-605-6585
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)
Office of Highway Safety (HHS-31)
400 Seventh Street, SW
Washington, DC 20590-0001
Ph: 202-366-0411

Fax: 202-366-2249
Internet: http://www.fhwa.dot.gov
Order from:

Superintendent of Documents
U. S. Government Printing Office (GPO)
732 North Capitol Street, NW
Washington, DC 20401
Ph: 888-293-6498 or 202-512-1530
Fax: 202-512-1262
E-mail: gpoaccess.gpo
Internet: http://www.gpoaccess.gov

U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
1800 F Street, NW
Washington, DC 20405
Ph: 202-501-1021
Order from:
General Services Administration
Federal Supply Service Bureau
1941 Jefferson Davis Highway
Arlington, VA 22202
Ph: 703-605-5400
Internet: http://apps.fss.gsa.gov/pub/fedspecs/indexcfm

- - - - - Commercial Item Description Documents - - - - -

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
8601 Adelphi Road
College Park, MD 20740-6001
Ph: 866-272-6272
Fax: 301-837-0483
Internet: http://www.archives.gov
Order documents from:
Superintendent of Documents
U.S.Government Printing Office (GPO)
732 North Capitol Street, NW
Washington, DC 20401
Ph: 888-293-6498 or 202-512-1530
Fax: 202-512-1262
E-mail: gpoaccess.gov
Internet: http://www.gpoaccess.gov

-- End of Section --

SECTION 01450N

CONSTRUCTION QUALITY CONTROL
08/04

PART 1 GENERAL

1.1 REFERENCES

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.

ASTM INTERNATIONAL (ASTM)

ASTM C 1077	(2003a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 294	(2004) Standard Descriptive Nomenclature for Constituents of Concrete Aggregates
ASTM C 295	(2003) Petrographic Examination of Aggregates for Concrete
ASTM C 31/C 31M	(2003a) Making and Curing Concrete Test Specimens in the Field
ASTM C 78	(2002) Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Quality Control (QC) Plan; G

Submit a Construction QC Plan prior to start of construction.

SD-07 Certificates

Contractor Quality Control Staff; G, ED

American Concrete Institute certification for Contractor Quality Control staff. Qualifications and resumes for

petrographer, surveyor, concrete batch plant operator, and profilograph operator.

Laboratory Accreditation; G, ED

Accreditation of the commercial laboratory by an independent evaluation authority, indicating conformance to ASTM C 1077, including all applicable test procedures.

Commercial Laboratory; G, ED

USACE validation letter for commercial laboratory.

1.3 INFORMATION FOR THE CONTRACTING OFFICER

All electronic submissions of QC documentation will be through the Web Based Construction Management (WebCM) system. Refer to the requirements of Section 01322 "Web Based Construction Management (WebCM)". The Contractor shall use the Daily Report forms that are available in WebCM.

Deliver the following to the Contracting Officer during Construction:

a. CQC Report: Submit the report electronically by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work. All reports shall be submitted in PDF format

b. Contractor Production Report: Submit the report electronically by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work.

c. Preparatory Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Preparatory Phase held.

d. Initial Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Initial Phase held.

f. Field Test Reports: Within two working days after the test is performed, submit the report as an electronic attachment to the CQC Report.

g. Monthly Summary Report of Tests: Submit the report as an electronic attachment to the CQC Report at the end of each month.

h. Testing Plan and Log: Submit the report as an electronic attachment to the CQC Report, at the end of each month. A copy of the final Testing Plan and Log shall be provided to the OMSI preparer for inclusion into the OMSI documentation.

i. Rework Items List: Submit lists containing new entries daily, in the same manner as the CQC Report.

j. CQC Meeting Minutes: Within two working days after the meeting is held, submit the report as an electronic attachment to the CQC Report.

k. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Organization, a QC Plan, a QC Plan Meeting, a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, completion inspections, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC Program shall cover on-site and off-site work and shall be keyed to the work sequence. No work or testing may be performed unless the QC Manager is on the work site. The QC Manager shall report directly to an officer of the firm and shall not be the same individual as, nor be subordinate to the project superintendent or the project manager. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the Quality Control Manager is the primary individual responsible for quality control, all three individuals will be held responsible for the quality of the work on the job. The Project Superintendent will be held responsible for the quality of production work.

1.4.1 Acceptance of the Construction Quality Control (QC) Plan

Acceptance of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel shall be subject to acceptance by the Contracting Officer. The Contracting Officer may require the removal of any individual for non-compliance with quality requirements specified in the Contract.

1.4.2 Preliminary Construction Work Authorized Prior to Acceptance

The only construction work that is authorized to proceed prior to the acceptance of the QC Plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.3 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed changes in the QC Plan or changes to the QC organization personnel, a minimum of 10 work days prior to a proposed change. Proposed changes shall be subject to acceptance by the Contracting Officer.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The only duties and responsibilities of the QC Manager are to manage and implement the QC program on this Contract. The QC Manager shall not be designated as the safety competent person as defined by EM 385-1-1. The QC Manager is required to attend the partnering meetings, QC Plan Meetings, Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this Contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by testing laboratory personnel and any other inspection and testing personnel required by this Contract. The QC Manager is the manager of all QC activities.

1.5.1.2 Qualifications

An individual with a minimum of 5 years combined experience in the following positions: Project Superintendent, QC Manager, Project Manager, Project Engineer or Construction Manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual shall have at least two years experience as a QC Manager. The individual must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification and safety compliance. If QC Manager is to perform inspections of concrete paving operations, he/she must be a certified ACI Concrete Inspector. If not, a separate ACI Certified Concrete Inspector will be required to be on site any time work or testing in the concrete discipline is ongoing.

1.5.2 Contractor Quality Control Staff

All Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) certified in the following grade (or shall have written evidence acceptable to the Contracting Officer's representative of having completed similar qualification programs):

1. CQC personnel responsible for inspection of concrete paving operations: ACI Concrete Transportation Inspector.

2. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews: ACI Concrete Flatwork Technician/Finisher.

3. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

4. Laboratory Testing Technicians: ACI Concrete Strength Testing Technician and Laboratory Testing Technician, Grade I or II.

The QC Manager may perform the duties of the ACI Certified Concrete Inspector if he/she holds the required certification and experience.

1.5.3 Other Staff

Submit for approval, the qualifications and resumes for the following staff:

1. Petrographer: Bachelor of Science degree in geology or petrography, trained in petrographic examination of concrete aggregate according to ASTM C 294 and ASTM C 295 and trained in identification of the specific deleterious materials and tests identified in this specification. Resume shall detail the education, training and experience related to the project-specific test methods and deleterious materials and shall be submitted at least 20 days before petrographic and deleterious materials examination is to commence.

2. Licensed Surveyor: All survey work shall be performed under the supervision of a Licensed Surveyor.

3. Concrete Batch Plant Operator: National Ready Mix Concrete Association (NRMCA) Level 2.

4. Profilograph Operator: Certification by equipment manufacturer or a state Department of Transportation.

1.5.4 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager shall have completed the course entitled "Construction Quality Management (CQM) for Contractors." If the QC Manager does not have a current certification, they shall obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

1.5.5 Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager shall be the same as for the QC Manager.

1.5.6 Safety Specialist

Provide a Safety Specialist at the work site to perform safety management, surveillance, inspections and safety enforcement for the contractor. The Safety specialist shall be the safety "competent person" as defined by EM 385-1-1. The Safety Specialist shall be at the work site at all times whenever work or testing is being performed and shall conduct daily safety inspections. Project Superintendent may perform duties of Safety Specialist.

1.5.7 Submittal Reviewer Duties and Qualifications

Provide a Submittal Reviewer, other than the QC Manager, qualified in the discipline being reviewed, to review and certify that the

submittals meet the requirements of this Contract prior to certification or approval by the QC Manager.

Each submittal shall be reviewed by a professional engineer.

Each of the following submittals shall be reviewed by an individual meeting the qualifications/experience specified below:

Qualification/Experience in Submittal Discipline	Submittals to be reviewed: Spec Section No.	Submittal
Registered Civil Engineer	Division 02 and 03	All

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Construction Quality Control (QC) Plan

1.6.1.1 Requirements

Provide, for acceptance by the Contracting Officer, a Construction QC Plan submitted in a three-ring binder that includes a table of contents, major sections identified with tabs, with pages numbered sequentially, and that documents the proposed methods and responsibilities for accomplishing commissioning activities during the construction of the project:

I. QC ORGANIZATION: A chart showing the QC organizational structure.

II. NAMES AND QUALIFICATIONS: Names and qualifications, in resume format, for each person in the QC organization. Include the CQM for Contractors course certifications for the QC Manager and Alternate QC Manager as required by the paragraphs entitled "Construction Quality Management Training" and "Alternate QC Manager Duties and Qualifications".

III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL: Duties, responsibilities, and authorities of each person in the QC organization.

IV. OUTSIDE ORGANIZATIONS: A listing of outside organizations, such as architectural and consulting engineering firms, that will be employed by the Contractor and a description of the services these firms will provide.

V. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as described in this Contract. Include in this letter the responsibility of the QC Manager and Alternate QC Manager to implement and manage the three phases of control, and their authority to stop work which is not in compliance with the Contract. The QC Manager shall issue letters of direction to all other QC Specialists outlining their duties, authorities, and responsibilities. Copies of the letters shall be included in the QC Plan.

VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving, and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in section 01330 SUBMITTAL PROCEDURES.

VII. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs entitled "Accreditation Requirements", as applicable.

VIII. TESTING PLAN AND LOG: A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test. Use Government forms to log and track tests.

IX. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track, and complete rework items. Use Government WebCM forms to record and track rework items.

X. DOCUMENTATION PROCEDURES: Use Government WebCM form.

XI. LIST OF DEFINABLE FEATURES: A Definable Feature of Work (DFOW) is a task that is separate and distinct from other tasks and has control requirements and work crews unique to that task. A DFOW is identified by different trades or disciplines and is an item or activity on the construction schedule. The list of DFOWs shall include, but not be limited to, all critical path activities on the NAS. Include all activities for which this specification requires QC Specialists or specialty inspection personnel. Each design development stage and submittal package shall have separate DFOWs in the Network Analysis Schedule.

XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL: Identify procedures you will use to ensure the three phases of control are used to manage the quality on this project. For each DFOW, a Preparatory and Initial phase checklist will be filled out during the Preparatory and Initial phase meetings. The checklist(s) will then also be entered in WebCM. The Preparatory and Initial Phases and meetings shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems for each DFOW.

XIII. PERSONNEL MATRIX: Not Applicable

XIV. PROCEDURES FOR COMPLETION INSPECTION: Procedures for identifying and documenting the completion inspection process. Include in these procedures the responsible party for punch out inspection, pre-final inspection, and final acceptance inspection.

XV. TRAINING PROCEDURES AND TRAINING LOG: Not Applicable

XVI. ORGANIZATION AND PERSONNEL CERTIFICATIONS LOG: Procedures for coordinating, tracking and documenting all certifications on

subcontractors, testing laboratories, suppliers, personnel, etc. QC Manager will ensure that certifications are current, appropriate for the work being performed, and will not lapse during any period of the contract that the work is being performed.

1.7 QC PLAN MEETINGS

Prior to submission of the QC Plan, the QC Manager will meet with the Contracting Officer to discuss the QC Plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding of the QC Plan requirements prior to plan development and submission and to agree on the Contractor's list of DFOWs.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to the start of construction, the QC Manager will meet with the Contracting Officer to present the QC program required by this Contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, and the coordination of the Contractor's management, production and QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each DFOW. As a minimum, the Contractor's personnel required to attend shall include an officer of the firm, the Project Manager, Project Superintendent, QC Manager, Alternate QC Manager, and subcontractor representatives. Each subcontractor who will be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by the Contractor and the Contracting Officer. The Contractor shall provide a copy of the signed minutes to all attendees and shall be included in the QC Plan. Repeat the coordination and mutual understanding meeting when a new QC Manager is appointed.

1.9 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings weekly at the work site with the Project Superintendent and the foremen who are performing the work of the DFOWs. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. The Contracting Officer may attend these meetings. As a minimum, the following shall be accomplished at each meeting:

a. Review the minutes of the previous meeting;

b. Review the schedule and the status of work and rework;

c. Review the status of submittals;

d. Review the work to be accomplished in the next two weeks and documentation required;

e. Resolve QC and production problems (RFI, etc.);

f. Address items that may require revising the QC Plan, and;

g. Review Accident Prevention Plan (APP).

1.10 THREE PHASES OF CONTROL

The Three Phases of Control shall adequately cover both on-site and off-site work and shall include the following for each DFOW.

1.10.1 Preparatory Phase

Notify the Contracting Officer at least two work days in advance of each preparatory phase meeting. The meeting shall be conducted by the QC Manager and attended by the Project Superintendent, and the foreman responsible for the DFOW. When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman shall attend the preparatory phase meeting. Document the results of the preparatory phase actions in the Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;

d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;

e. Examine the work area to ensure that the required preliminary work has been completed;

f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;

g. Discuss construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW; and

h. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

1.10.2 Initial Phase

Notify the Contracting Officer at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the Project Superintendent, and the foreman responsible for that DFOW. Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the Initial Phase Checklist. Repeat the initial phase for each new crew

to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Ensure that testing is performed by the approved laboratory, and

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

1.10.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report:

a. Ensure the work is in compliance with Contract requirements;

b. Maintain the quality of workmanship required;

c. Ensure that testing is performed by the approved laboratory; and

d. Ensure that rework items are being corrected.

1.10.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

1.10.5 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.11 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section 01330 SUBMITTAL PROCEDURES.

1.12 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

1.12.1 Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a

copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office. All testing/sampling shall be performed by approved laboratory personnel and not by the QC manager.

The accreditation shall be current and shall include the required and optional test methods, as specified in Section 02753. Onsite temperature-controlled concrete curing facilities shall be provided.

1. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies shall be performed by a commercial laboratory.

2. Acceptance Testing: The Contractor shall furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Steel molds shall be used for molding the beam specimens. The Contractor shall furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C 31/C 31M. Flexural loading equipment shall be in accordance with ASTM C 78.

3. Contractor Quality Control: All sampling and testing shall be performed by an approved, onsite, independent, commercial laboratory, or for cementitious materials and admixtures, the manufacturer's laboratory.

4. Laboratory Inspection: The Government will inspect the laboratory equipment and test procedures prior to the start of concreting operations for conformance to ASTM C 1077. The laboratory shall maintain this certifications for the duration of the project.

1.12.2 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at http://ts.nist.gov/ts/htdocs/210/214/214.htm , the American Association of State Highway and Transportation Officials (AASHTO) program at http://www.transportation.org/aashto/home.nsf/frontpage , International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, U. S. Army Corps of Engineers Materials Testing Center (MTC)at http://www.wes.army.mil/SL/MTC/, the American Association for Laboratory Accreditation (A2LA) program at http://www.a2la.org/, the Washington Association of Building Officials (WABO) at http://www.wabo.org/ (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) at http://www.wacel.org/labaccred.html (Approval authority by WACEL is

limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

1.12.3 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.12.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month, per the paragraph entitled "INFORMATION FOR THE CONTRACTING OFFICER".

1.12.5 Test Reports and Monthly Summary Report of Tests

The QC Manager shall furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. A copy of the signed test reports and certifications shall be provided to the OMSI preparer for inclusion into the OMSI documentation.

1.13 QC CERTIFICATIONS

1.13.1 CQC Report Certification

Each CQC Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.13.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current, coordinated and attesting that the work for which payment is requested, including stored material, is in compliance with Contract requirements.

1.13.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the

work has been completed, inspected, tested and is in compliance with the Contract." A copy of this final QC Certification for completion shall be provided to the OMSI preparer for inclusion into the OMSI documentation.

1.14 COMPLETION INSPECTIONS

1.14.1 Punch-Out Inspection

Near the completion of all work or any increment thereof, established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract. Include in the punch list any remaining items on the "Rework Items List", which were not corrected prior to the Punch-Out Inspection. The punch list shall include the estimated date by which the deficiencies will be corrected. A copy of the punch list shall be provided to the Contracting Officer. The QC Manager, or staff, shall make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government "Pre-Final Inspection".

1.14.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" may be developed as a result of this inspection. The QC Manager shall ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in a timely manner and shall be accomplished before the contract completion date for the work,or any particular increment thereof, if the project is divided into increments by separate completion dates.

1.14.3 Final Acceptance Inspection

The Contractor shall notify the Contracting Officer at least 14 calendar days prior to the date a final acceptance inspection can be held. The notice shall state that all items previously identified on the pre-final punch list will be corrected and acceptable, along with any other unfinished Contract work, by the date of the final acceptance inspection. The Contractor shall be represented by the QC Manager, the Project Superintendent, and others deemed necessary. Attendees for the Government will include the Contracting Officer, other ROICC personnel, and personnel representing the Client. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract Clause entitled "Inspection of Construction."

1.15 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities. The Contractor shall submit all documentation per Section 01322 WEB BASED CONSTRUCTION MANAGEMENT (WEBCM).

1.15.1 Construction Documentation

Reports are required for each day that work is performed and shall accompany the submission of the Contractor Quality Control Report prepared for the same day. Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER" shall be used. Reports are required for each day work is performed. Account for each calendar day throughout the life of the Contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The Project Superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work shall be identified by terminology consistent with the construction schedule. In the "remarks" sections of the reports, enter pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, meetings held. For each entry in the report(s), identify the Schedule Activity No. that is associated with the entered remark.

1.15.2 Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders shall be divided and tabbed as shown below. These binders shall be readily available to the Contracting Officer during all business hours.

a. All completed Preparatory and Initial Phase Checklists, arranged by specification section.

b. All milestone inspections, arranged by Activity Number.

c. An up-to-date copy of the Testing Plan and Log with supporting field test reports, arranged by specification section.

d. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.

e. An up-to-date copy of the Rework Items List.

f. Maintain up-to-date copies of all punch lists issued by the QC staff to the Contractor and Sub-Contractors and all punch lists issued by the Government.

1.15.3 Contractor Quality Control Report

Reports are required for each day that work is performed and for every seven consecutive calendar days of no-work period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

a. Identify the control phase and the definable feature of work.

b. Results of the Preparatory Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedule have been discussed, and that safety and hazard analysis was addressed.

c. Results of the Initial Phase meeting held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, tests results are acceptable, work is in compliance with the Contract, work complies with safety requirements, and the required testing has been performed and include a list of who performed the tests.

d. Results of the follow-up Phase inspections held including the location of the definable feature of work. Indicate in the report for this definable feature of work that the work complies with the Contract as approved in the Initial Phase, work complies with safety requirements, and that required testing has been performed and include a list of who performed the tests.

e. Results of the three phases of control for off-site work, if applicable, including actions taken.

f. List the rework items identified, but not corrected by close of business.

g. List of rework items corrected from the rework items list along with the corrective action taken.

h. Include a "remarks" section in this report which will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Organization and corrective action taken by the Contractor.

i. Document safety inspections performed

j. Contractor Quality Control Report certification.

1.15.4 Testing Plan and Log

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" the date the test was performed and the date the test results were forwarded to the Contracting Officer. Attach a copy of the updated "Testing Plan and Log" to the last daily CQC Report of each month, per the paragraph "INFORMATION FOR THE CONTRACTING OFFICER". A copy of the final "Testing Plan and Log" shall be provided to the OMSI preparer for inclusion into the OMSI documentation.

1.15.5 Rework Items List

The QC Manager shall maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. The Contractor shall be responsible for including those items identified by the Contracting Officer.

1.15.6 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by Section 01770N CLOSEOUT PROCEDURES are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager shall initial each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.16 NOTIFICATION ON NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected non-compliance with the Contract. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time for excess costs or damages by the Contractor.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01455A

CHEMICAL DATA QUALITY CONTROL
07/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 200-1-3	(2001) Requirements for the Preparation of Sampling and Analysis Plans
EM 200-1-6	(1997) Chemical Quality Assurance for HTRW Projects
ER 1110-1-263	(1998) Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 540/R 94-008	(1999) USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review
EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 268	Land Disposal Restrictions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

1.2 ACRONYMS

The definition of acronyms used by the Contractor that pertain to chemical data quality control shall be clearly defined for all contract related products and communications.

1.3 MEASUREMENT AND PAYMENT

Separate payment will not be made for providing and maintaining the chemical data quality requirements including the chemical data quality management, chemical data validation, minimum chemical data reporting requirements, and chemical data quality submittal requirements; these costs shall be included in the applicable unit prices or lump sum prices contained in the bidding schedule.

1.4 CHEMISTRY REQUIREMENTS

Chemical Data Quality Control (CDQC) shall be as defined in ER 1110-1-263; this ER, which integrates USACE guidance on the subject, shall be supplemented by EM 200-1-6 for detail technical guidance on CDQC. Tables and charts defining Design Analysis (DA), ROD, and remedial technology specific chemistry shall be according to or consistent with EM 200-1-3.

1.4.1 Site History

The current site is not anticipated to encounter contaminated or hazardous material. The site is adjacent to an Environmental Restoration Program (ERP) Site located near the existing hangars. Contamination may have migrated outside the ERP into the current project site. Contamination in the ERP Site includes TPH-Gasoline, chloroform, chloromethane, trans-1, cis-1, 2-Dichloroethene, methyl t-butyl ether (MTBE), tetrachlorethene, vinyl chloride, toluene, m,p-xylenes and trichlorethene.

1.4.2 Data Quality Objectives (DQO)

Sample acquisition, chemical analysis and chemical parameter measurements shall be performed so that the resulting data meet and support data use requirements. The chemical data shall be acquired, documented, verified and reported to ensure that the specified precision, accuracy, representativeness, comparability, completeness and sensitivity requirements are achieved.

1.4.3 Sampling, Analysis and Measurement

1.4.3.1 Soil/Sediment and Ground/Surface Water Samples

Soil/sediment and ground/surface water samples shall be collected and analyzed and/or shipped to a primary laboratory according to the following methods:

a. Soil/Sediment: All excavated soil determined to be contaminated must be stockpiled according to the requirements of Travis AFB. All excess soil shall be screened for volatile organic compounds using a properly calibrated organic vapor meter. Screening samples registering less than 1 part per million can be considered clean. This soil may be used in other areas of the construction as fill. Clean soil shall be

segregated and stockpiled separately from contaminated soil. Excess soil that has been screened and exceeds 1 ppm on the organic vapor meter must be sampled and analyzed according to the frequency and methods required by the off-site disposal facility. The disposal facility shall be approved by the Travis AFB Environmental office. Soil confirmation tests excavations shall be sampled and analyzed for Total Petroleum Hydrocarbons, Diesel-range Organics, and Gasoline-range Organics (TPH-DRO/GRO)(Methods SW-846 3550C/8015B and 5035/8015B, Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) (SW-846 5035/8021B).

b. Ground/Surface Water: The Contractor shall assume there will be no contaminated water to be disposed of. Most of the construction area is above the ground water table. If ground water is encountered and dewatered, visual and olfactory inspection can be used to determine if the ground water is clean per the Travis AFB Environmental Office. Clean ground water shall be discharged to the ground surface. If contaminated ground water is encountered, it should be collected and either treated at the ground water treatment plant or taken off Base for disposal. Dewatered ground water may be treated at the Base ground water treatment plant. Contaminated ground water shall be tested for VOCS (SW846 8260B), SVOCs (SW846 8270C), and TPH (SW846 8015B) and the results provided to Tom Sreenivastan of the Environmental Office (707) 424-3172. Mr. Sreenivastan shall be notified in advance of the quantity of water to be treated. The Environmental Office will provide the information to the Ground Water Treatment Plant Operator who will approve and schedule disposal of the de-watering water in the plant. Because the ground water is much deeper than the construction trenches, it is anticipated that there will be no contaminated ground water from dewatering to be disposed of. Ground water from dewatering that must be disposed of off-site must be tested according to the requirements of the disposal facility. Assume the default disposal facility testing requirements are the same as the Base Treatment Plant.

1.4.3.2 Manifesting Samples

Material shipping manifesting shall be in accordance with 40 CFR 261, 40 CFR 262, 40 CFR 268, 49 CFR 172, and 49 CFR 178. Manifesting samples shall be collected and analyzed according to Travis AFB Environmental Office, and the approved disposal facility.

1.4.3.3 Real-Time Instrumental Measurement Samples

Volatiles shall be measured on-site with a photo-ionization detector (PID). Soil that reads < 1 ppm is considered clean.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality

Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sampling and Analysis Plan; G,

The SAP including the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP), no later than 30 days after receipt of notice to proceed.

SD-06 Test Reports

Chemistry Data Package

The chemistry data package shall be provided to the QA lab at the end of the project.

1.6 QUALITY ASSURANCE ELEMENTS

The Contractor shall be responsible for the following QA elements necessary to monitor and ensure the quality of chemical data produced.

1.6.1 Laboratory Validation Requirements

Any Contract lab used on this project must be certified by the State of California.

1.6.2 Review of Primary Laboratory Data

The Contractor shall be responsible for the independent data review of the entire primary data set.

1.6.3 Validation of Data

The Contractor shall be responsible for validating 10 percent of the data in accordance with EPA 540/R 94-008. The data validation strategy shall be established at the beginning of the project to be consistent with project DQO.

1.7 QUALIFICATIONS

1.7.1 Chemical Quality Control Officer

As a minimum, the Contractor's Chemical Quality Control Officer shall have: a bachelor degree in Chemistry; 2 years of experience related to investigations, studies, design and remedial actions at HTRW sites; and 2 field seasons (or one continuous calendar year experience) in calibration and operation of various field monitoring devices as well as standard analytical chemistry methods common for analyzing soil, water, air and other materials for chemical contamination assessment, including hazardous waste manifesting. The Chemical Quality Control Officer shall ensure that all chemistry related objectives including responsibilities for DQO definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained. The Chemical Quality Control officer need not

be present onsite during routine sampling, but shall be available for consultation with Government and Contractor personnel.

1.7.2 Environmental Sampler

As a minimum, the Contractor's Environmental Sampler shall have: 2 years of experience in the development and preparation of SAP and work plans; 2 years of experience in and knowledge of EPA methods for collecting environmental and hazardous waste samples; 2 years of experience in operation of field screening equipment (e.g. PID, FID, infrared spectrometer, immunoassay, etc.); and 2 field seasons of experience with the particular field screening techniques for use on this project. The Environmental Sampler shall collect all onsite samples and perform all field screening tests. The Environmental Sampler shall review the sampling results, and provide recommendations for the Contractor's sampling program. The Environmental Sampler shall be onsite during excavation and stockpiling operations involving contaminated soil or soil to be checked for contamination.

1.8 COORDINATION MEETING

After the preconstruction conference, before any sampling or testing, the Contractor and the Contracting Officer will meet at the construction site to discuss the CQC Plan and the SAP. The coordination meeting will be simultaneous to any CQC coordination meeting required in Section 01450N CONSTRUCTION QUALITY CONTROL unless otherwise indicated or directed. A list of definable features that involve chemical measurements shall be agreed upon. At a minimum, each matrix (soil, water, air, containerized wastes, radioactive wastes, instrumental chemical parameter measurement, etc.) shall be a definable work feature. Management of the chemical data quality system including project DQO, project submittals, chemical data documentation, chemical data assessment, required sampling and analysis protocols, and minimum data reporting requirements shall be agreed upon. The meeting will serve to establish an interrelationship between the Contractor's chemical data quality management and Government chemical quality assurance requirements. Minutes of the meeting will be documented by the Government and shall be signed by both the Contractor and the Contracting Officer. The minutes will include any or all unresolved chemical issues along with the conditions for resolution and will become a part of the contract file.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor shall be responsible for chemical sample acquisition, sample analysis, instrumental measurements of chemical parameters and for chemical data quality control. An effective chemical data quality control system shall be established that meets the requirements for the chemical measurement DQO applicable to the project. The system shall cover chemical measurements pertaining to and required for Contractor and subContractor produced chemical data. The Contractor shall control field screening, sampling, and testing in conjunction with remedial activities to meet all DQO; minimize the amount of

excavated material requiring temporary storage; prevent dilution of contaminated soils with clean soils; and ensure completion of work within the required time.

3.2 QUALITY CONTROL PLAN

3.2.1 Additional Requirements

In addition to the quality control requirements specified in Section 01450N CONSTRUCTION QUALITY CONTROL, the CQC Plan shall incorporate the qualifications, authority and responsibilities of all chemical quality management and support personnel. Chemical measurements including sampling and/or chemical parameter measurement will not be permitted to begin until after production and acceptance of the CQC Plan, and Government approval of the SAP.

3.2.2 Chemistry Elements of the CQC Plan

To cover contract related chemical measurements by the Contractor and all subContractors, the CQC Plan shall include the following as a minimum.

3.2.2.1 Qualifications

Names, education, experience qualifications, authorities, and decision-making responsibilities of all chemical quality management and support personnel. The CQC Plan shall contain a copy of a letter from the project QC manager designating and authorizing a Chemical Quality Control Officer and chemical quality control organization staff.

3.2.2.2 Authority and Responsibility

A diagram, flow chart, or figure clearly depicting the chemical data quality management and support staff and the authority and responsibility of each for chemical sampling and analysis, procedures for corrective actions, deliverables and submittals, deviations and changes, chemical quality documentation, data validation, minimum data reporting requirements, and DQO for chemical parameter measurement by the Contractor and subContractors. The contents of this section of the CQC Plan shall be included in the applicable "Project Organization" elements of the FSP and the QAPP.

3.3 SAMPLING AND ANALYSIS PLAN

The SAP shall be prepared in accordance with CDQC requirements and EM 200-1-3. The SAP shall be a single document that contains two distinct elements: FSP and QAPP. Sections of the FSP and QAPP shall not be cross referenced. The SAP shall confirm the Contractor's understanding of the contract requirements for chemical data quality control, and shall describe procedures for field sampling and sample submittal for analysis, field chemical parameter measurement, data documentation, data assessment and data reporting requirements. The SAP shall delineate the methods the Contractor intends to use to accomplish the chemical quality control items to assure accurate, precise, representative, complete, legally defensible and comparable data. The SAP shall describe all chemical parameter measurements for all matrices for all phases of the remediation contract. As a single

interrelated document, the SAP shall be provided to field and laboratory personnel. The Contractor may propose original/innovative approaches to chemical parameter measurements for cost reduction and remediation efficiency by abbreviated sampling, contingency sampling and/or contingency analysis, indicator or tracer analysis, onsite analytical services, equivalency or screening methods. The SAP shall clearly identify the Contractor obtained laboratories. The Contractor shall furnish copies of the Government approved SAP to all laboratories and the Contractor's field sampling crew. The SAP shall address all levels of the investigation with enough detail to become a document which may be used as an audit guide for field and laboratory work.

3.3.1 Field Sampling Plan

The FSP shall contain necessary technical detail and direction for the field personnel to understand sampling and field measurement requirements. The FSP shall provide a comprehensive description and full detail for personnel to perform all onsite activities required to attain project DQO, including: locations of samples, sampling procedures for onsite and offsite chemical analysis, summaries of analyses to be performed on samples, shipment of samples for offsite analyses, performance of onsite and offsite instrumental parameter measurements, data documentation and reporting requirements.

3.3.2 Quality Assurance Project Plan

The QAPP shall contain necessary technical detail and direction for field and laboratory personnel to understand project sample analysis, quality control and data reporting requirements, analytical methods, required detection limits, QC requirements, and data validation and reporting requirements.

3.4 CHEMISTRY DATA PACKAGE

The chemistry data package shall be produced and provided through Contracting Officer. The chemistry data package shall contain information to demonstrate that the project's DQO have been fulfilled. The QA function will compare QA sample results to corresponding primary sample results, will assess the Contractor's compliance with the SAP, and will recommend corrective action as necessary.

3.5 CONTROL OF CHEMICAL DATA QUALITY

Contractor chemical data quality control shall ensure that a quality control program is in place that assures sampling and analytical activities and the resulting chemical parameter measurement data comply with the DQO and the requirements of the SAP. The Contractor shall utilize the three-phase control system that includes a preparatory, initial and follow-up phase for each definable feature of work. The Contractor's three-phase chemical data control process shall ensure that data reporting requirements are achieved and shall be implemented.

3.6 ANALYTICAL TESTING LABORATORIES

The Contractor shall propose the analytical laboratories to be used for the primary samples analyses. Laboratory validation requirements shall be in accordance with paragraph Laboratory Validation Requirements. The Contractor may utilize its own laboratory or utilize subcontract laboratories to achieve the primary required sample analyses.

3.6.1 Laboratory Analytical Requirements

The Contractor shall provide the specified chemical analyses by the Contractor's laboratory. The Contractor shall provide chemical analyses to achieve the project DQO for all parameters specified by the methods. To give the Air Force programs the greatest flexibility in the execution of its projects, the EPA SW-846.3-3 methods are generally the methods employed for the analytical testing of environmental samples. These methods are flexible and shall be adapted to individual project-specific requirements.

3.6.2 Laboratory Performance

The Contractor shall provide continued acceptable analytical performance and shall establish a procedure to address data deficiencies noted by review and/or quality assurance sample results. The Contractor shall provide and implement a mechanism for providing analytical labs with the SAP or QAPP portion of the SAP, for monitoring the lab's performance and for performing corrective action procedures. The Contractor shall acquire analytical services with additional State of California validated laboratories in the event a project lab loses its validation status during the project.

3.7 DOCUMENTATION

Documentation records shall be provided as factual evidence that required chemical data has been produced and chemical data quality has been achieved. The documentation shall comply with the requirements specified in paragraphs SAMPLING AND ANALYSIS PLAN and CHEMISTRY DATA PACKAGE.

3.8 NOTIFICATION OF NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice.

-- End of Section --

SECTION 01500N

TEMPORARY FACILITIES AND CONTROLS
10/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C511	(1997) Reduced-Pressure Principle Backflow Prevention Assembly

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	(continuously updated) List of Approved Backflow Prevention Assemblies
FCCCHR Manual	(9th Edition) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2000) Safeguarding Construction,Alteration, and Demolition Operations
NFPA 70	(2005) National Electrical Code

U. S. Air Force

ETL 04-2	Standard Airfield Pavement Marking Schemes

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA SA-89-006	(1988) Manual on Uniform Traffic Control Devices for Streets and Highways

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Traffic control plan; G

SD-06 Test Reports

Backflow Preventer Tests; G

SD-07 Certificates
Backflow Preventers Certificate of Full Approval

1.3 BACKFLOW PREVENTERS CERTIFICATE

Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval. Certificate of Provisional Approval will not be acceptable.

1.3.1 Backflow Prevention Training Certificate

The Contractor shall submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

1.4 TEMPORARY UTILITIES

The Contractor shall provide his own utilities.

1.5 STATION OPERATION AFFECT ON CONTRACTOR OPERATIONS

1.5.1 Restricted Access Areas

The Government will monitor work in the Airfield Spots 605 & 606 area and the adjacent airfield. Notify Contracting Officer at least 14 calendar days prior to starting work in these areas.

1.5.2 Special Restrictions Regarding Access of Vehicles and Parking

1.5.2.1 Interruption of Vehicular Traffic

If during the performance of work, it becomes necessary to modify vehicular traffic patterns at any locations, notify the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan shall be in accordance with State and local regulations and the FHWA SA-89-006, Part VI. Provide cones, signs, barricades, lights, or other traffic control devices and personnel required to control traffic. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

1.6 ACCESS CONTROLS

1.6.1 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking

areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic.

Airfield barricades shall be securely placed at maximum intervals of 50 feet, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night. Airfield barricades shall be reflective orange and white with amber-yellow lights. All airfield barricades shall be anchored or be of sufficient mass to retain an established position where they are placed. Flashing lights must be at least five candelas effective intensity and flash at a rate of from 55 to 75 flashes per minute. Continuous burning lights must have an effective intensity of 10 candelas. Barricades shall be located as shown on the Drawings and in accordance with ETL 04-2, paragraph 9.2.

1.6.2 Closed Pavement Marking

The Contractor shall erect and maintain temporary closed pavement markings to indicate the temporary closing of the taxiway. Such pavement markings shall be required at locations shown on the plans and at all other areas indicated by the Contracting Officer. Barricades shall be constructed and placed in accordance with ETL 04-2, paragraph 9.1.4.

1.7 STORAGE AREAS

The Contract Clause entitled "FAR 52.236-10, Operations and Storage Areas" and the following apply:

1.7.1 Storage Size and Location

The open site available for storage shall be as indicated.

1.8 TEMPORARY SANITARY FACILITIES

Provide adequate sanitary conveniences of a type approved for the use of persons employed on the work, properly secluded from public observation, and maintained in such a manner as required and approved by the Contracting Officer. Maintain these conveniences at all times without nuisance. Upon completion of the work, remove the conveniences from the premises, leaving the premises clean and free from nuisance. Dispose of sewage through connection to a municipal, district, or station sanitary sewage system. Where such systems are not available, use chemical toilets or comparably effective units, and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge shall be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Include provisions for pest control and elimination of odors.

1.9 TEMPORARY BUILDINGS

Locate these where directed and within the indicated operations area. The Contractor will provide an on site office trailer as necessary for the accomplishment of the work. The trailer shall conform to the following criteria: Trailer shall be well maintained, and not appear in a condition requiring extensive repair, trailer color shall be light beige for the body, with optional medium to dark brown trim. In no case shall a trailer be permitted on the work site, unless color is approved by the Contracting Officer. It may be required to locate Contractor work trailer in an area not adjacent to the construction site. Location of the Contractor work trailer must be approved by the Contracting Officer. Failure of Contractor to maintain trailers or storage buildings in good condition will be considered sufficient reason to require their removal. A sign not smaller than 600 mm by 600 mm shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number. Trailer shall be anchored to resist high winds and must meet applicable state and local standards for anchoring mobile trailers.

1.9.1 Maintenance of Temporary Facilities

Suitably paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

1.9.2 Quality Control Manager Records and Field Office

Provide on the jobsite an office with approximately 100 square feet of useful floor area for the exclusive use of the QC Manager. Provide a weathertight structure with adequate heating and cooling, toilet facilities, lighting, ventilation, a 4 by 8 foot plan table, a standard size office desk and chair, computer station, and working communications facilities. Provide either a 1,500 watt radiant heater and a window-mounted air conditioner rated at 9,000 Btus minimum or a window-mounted heat pump of the same minimum heating and cooling ratings. Provide a door with a cylinder lock and windows with locking hardware. Make utility connections. Locate as directed. File quality control records in the office and make available at all times to the Government. After completion of the work, remove the entire structure from the site.

PART 2 PRODUCTS

2.1 BACKFLOW PREVENTERS

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, brass mounted gate valve and strainer, 304 stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed shall be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and shall be accompanied by a Certificate of Full Approval from FCCCHR List.

PART 3 EXECUTION

3.1 TEMPORARY PHYSICAL CONTROLS

3.1.1 Access Controls

3.1.1.1 Temporary Barricades

Contractor shall provide for barricading around all work areas to prevent public access.

3.1.1.2 Fencing

Fencing shall be provided along the construction site at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 lb against it. Fencing shall be 8 ft high chain link construction with brown fabric on fence.

Enclose the project work are and Contractor lay-down area with a 8 foot high chain link fence and gates with brown, UV light resistant, plastic fabric mesh netting (similar to tennis court or other screening). Remove the fence upon completion and acceptance of the work. Intent is to block (screen) public view of the construction.

3.1.1.3 Signs

Place warning signs at the construction area perimeter designating the presence of construction hazards requiring unauthorized persons to keep out. Signs must be placed on all sides of the project, with at least one sign every 300 feet. All points of entry shall have signs designating the construction site as a hard hat area.

3.1.1.4 Traffic Work

All work around/involving roadways, to include roadway excavations and utility crossings, will be conducted in accordance with Manual of Traffic Control Devices. Contractors shall provide and ensure appropriate road closure and detour signs are established as necessary for motor traffic management. All road closures shall be coordinated with the Contracting Officer in advance. Self-illuminated (lighted) barricades shall be provided during hours of darkness. Brightly-colored (orange) vests are required for all personnel working in roadways. Road closures shall require a road closure plan showing the location of signage.

3.2 TEMPORARY WIRING

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Program shall include frequent inspection of all equipment and apparatus.

3.3 REDUCED PRESSURE BACKFLOW PREVENTERS

Provide an approved reduced pressure backflow prevention assembly at each location where the Contractor taps into the Government potable water supply.

A certified tester(s) shall perform testing of backflow preventer(s) for proper installation and operation and provide subsequent tagging.

Backflow preventer tests shall be performed using test equipment, procedures, and certification forms conforming to those outlined in the latest edition of the Manual of Cross-Connection Control published by the FCCCHR Manual. Test and tag each reduced pressure backflow preventer upon initial installation (prior to continued water use) and quarterly thereafter. Tag shall contain the following information: make, model, serial number, dates of tests, results, maintenance performed, and signature of tester. Record test results on certification forms conforming to requirements cited earlier in this paragraph.

-- End of Section --

SECTION 01525

SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS
10/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.32	Personal Fall Protection - Safety Requirements for Construction and Demolition Operations
ANSI Z359.1	(1992; R 1999) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
ANSI/ASSE A10.34	(2001) Protection of the Public on or Adjacent to Construction Sites
ASME B30.3	(1996) Construction Tower Cranes

ASME INTERNATIONAL (ASME)

ASME B30.22	(2000) Articulating Boom Cranes
ASME B30.5	(2004) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2002) Portable Fire Extinguishers
NFPA 241	(2000) Safeguarding Construction,Alteration, and Demolition Operations
NFPA 51B	(2003) Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2005) National Electrical Code
NFPA 70E	(2004) Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Government acceptance is required for submittals with a "G, A" designation.

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G, A

Activity Hazard Analysis (AHA); G, A

Crane Critical Lift Plan; G, A

Proof of qualification for Crane Operators; G, A

SD-06 Test Reports

Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

Accident Reports

Monthly Exposure Reports

Crane Reports

SD-07 Certificates

Confined Space Entry Permit

Hot work permit

Certificate of Compliance (Crane)

Submit one copy of each permit/certificate attached to each Daily Quality Control Report.

1.3 DEFINITIONS

a. High Visibility Accident. Any mishap which may generate publicity and/or high visibility.

b. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

c. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

(1) Death, regardless of the time between the injury and death, or the length of the illness;

(2) Days away from work (any time lost after day of injury/illness onset);

(3) Restricted work;

(4) Transfer to another job;

(5) Medical treatment beyond first aid;

(6) Loss of consciousness; or

(7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

d. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.

e. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).

1.4 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, work performed shall comply with USACE EM 385-1-1, and the following federal, state, and local, laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification,

applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.5 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.5.1 Personnel Qualifications

1.5.1.1 Site Safety and Health Officer (SSHO)

Site Safety and Health Officer (SSHO) shall be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The Contractor Quality Control (QC) person cannot be the SSHO on this project, even though the QC has safety inspection responsibilities as part of the QC duties. The SSHO shall meet the following requirements:

Level 4:

A minimum of 5 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following 4 areas of competency: Excavation; Scaffolding; Confined space; Personal protective equipment and clothing to include selection, use and maintenance.

1.5.1.2 Crane Operators

Crane operators shall meet the requirements in USACE EM 385-1-1, Section 16 and Appendix G. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacitates of 50,000 pounds or greater, crane operators shall be designated as qualified by a source that qualifies crane operators (i.e., union, a government agency, or and organization that tests and qualifies crane operators). Proof of current qualification shall be provided.

1.5.2 Personnel Duties

1.5.2.1 Site Safety and Health Officer (SSHO)/Superintendent

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors' daily quality control report.

b. Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and sub-contractors.

c. Maintain applicable safety reference material on the job site.

d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.

e. Implement and enforce accepted APPS and AHAs.

f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. A list of unresolved safety and health deficiencies shall be posted on the safety bulletin board.

g. Ensure sub-contractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

1.5.3 Meetings

1.5.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. The Contractor shall discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, a schedule for the preparation, submittal, review, and acceptance of AHAs shall be established to preclude project delays.

c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Work shall not begin until there is an accepted APP.

d. The functions of a Preconstruction conference may take place at the Post-Award Kickoff meeting for Design Build Contracts.

1.6 ACCIDENT PREVENTION PLAN (APP)

The Contractor shall use a qualified person to prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of USACE EM 385-1-1 and as supplemented herein. Cover all

paragraph and subparagraph elements in USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan". Specific requirements for some of the APP elements are described below. The APP shall be job-specific and shall address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Any portions of the Contractor's overall safety and health program referenced in the APP shall be included in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer and any designated CSP and/or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any hazard become evident, stop work in the area, secure the area, and develop a plan to remove the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, all necessary action shall be taken to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ANSI/ASSE A10.34,) and the environment.

Copies of the accepted plan will be maintained at the Contracting Officer's office and at the job site.
The APP shall be continuously reviewed and amended, as necessary, throughout the life of the contract. Unusual or high-hazard activities not identified in the original APP shall be incorporated in the plan as they are discovered.

1.6.1 EM 385-1-1 Contents

In addition to the requirements outlines in Appendix A of USACE EM 385-1-1, the following is required:

a. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts

involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. The plan shall be submitted 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.C.18. and the following:

(1) For lifts of personnel, the plan shall demonstrate compliance with the requirements of 29 CFR 1926.550(g).

(2) For barge mounted mobile cranes, barge stability calculations identifying barge list and trim based on anticipated loading; and load charts based on calculated list and trim. The amount of list and trim shall be within the crane manufacturer's requirements.

b. Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02220 DEMOLITION and referenced sources.

c. Excavation Plan. The safety and health aspects prepared in accordance with Section 02300 EARTHWORK.

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE EM 385-1-1. Submit the AHA for review at least 15 calendar days prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

The activity hazard analyses shall be developed using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the Contracting Officer.

1.8 DISPLAY OF SAFETY INFORMATION

Within 1 calendar days after commencement of work, erect a safety bulletin board at the job site. The safety bulletin board shall include information and be maintained as required by EM 385-1-1, section 01.A.06. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.9 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.10 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.11 REPORTS

1.11.1 Accident Reports

a. For recordable injuries and illnesses, and property damage accidents resulting in at least $2,000 in damages, the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. For any weight handling equipment accident (including rigging gear accidents) the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the WHE Accident Report (Crane and Rigging Gear) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Crane operations shall not proceed until cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer. The Contracting Officer will provide a blank copy of the accident report form.

1.11.2 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Information shall include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted.

1.11.3 Monthly Exposure Reports

Monthly exposure reporting to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms.

1.11.4 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix H and as specified herein with Daily Reports of Inspections.

1.11.5 Certificate of Compliance

The Contractor shall provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a blank certificate). Certificate shall state that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance shall comply with 29 CFR 1926 and USACE EM 385-1-1 section 16 and Appendix H. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. The Contractor shall also certify that all of its crane operators working on the DOD activity have been trained in the proper use of all safety devices (e.g., anti-two block devices). These certifications shall be posted on the crane.

1.12 HOT WORK

Prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, a written permit shall be requested from the Fire Division. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

When starting work in the facility, Contractors shall require their personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

Obtain services from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems, welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, vaults, etc.) that have the potential for flammable or explosive atmospheres.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

The Contractor shall comply with USACE EM 385-1-1, NFPA 241, the APP, the AHA, Federal and/or State OSHA regulations, and other related

submittals and activity fire and safety regulations. The most stringent standard shall prevail.

3.1.1 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

3.1.2 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos. If material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting with the Contracting Officer to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

The Contractor shall establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. The program shall include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

3.3.1 Training

The Contractor shall institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, the Contractor shall provide training for each employee who might be exposed to fall hazards. A competent person for fall protection shall provide the training. Training requirements shall be in accordance with USACE EM 385-1-1, section 21.A.16.

3.3.2 Fall Protection Equipment and Systems

The Contractor shall enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Employees shall be protected from fall hazards as specified in EM 385-1-1, section 21. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, paragraphs 05.H. and 05.I. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with 29 CFR 1926.500, Subpart M, USACE EM 385-1-1 and ANSI A10.32.

3.3.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ANSI Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabineers shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 1.8 m (6 feet). The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.3.3 Horizontal Lifelines

Horizontal lifelines shall be designed, installed, certified and used under the supervision of a qualified person for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500).

3.3.4 Guardrails and Safety Nets

Guardrails and safety nets shall be designed, installed and used in accordance with EM 385-1-1 and 29 CFR 1926 Subpart M.

3.3.5 Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. A Rescue and Evacuation Plan shall be prepared by the contractor and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. The Rescue and Evacuation Plan shall be included in the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.4 EQUIPMENT

3.4.1 Material Handling Equipment

a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.

c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

3.4.2 Weight Handling Equipment

a. Cranes and derricks shall be equipped as specified in EM 385-1-1, section 16.

b. The Contractor shall comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Erection shall be performed under the supervision of a designated person (as defined in ASME B30.5). All testing shall be performed in accordance with the manufacturer's recommended procedures.

c. The Contractor shall comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.

d. Under no circumstance shall a Contractor make a lift at or above 90% of the cranes rated capacity in any configuration.

e. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and shall follow the requirements of USACE EM 385-1-1 section 11 and ASME B30.5 or ASME B30.22 as applicable.

f. Crane suspended personnel work platforms (baskets) shall not be used unless the Contractor proves that using any other access to the work location would provide a greater hazard to the

workers or is impossible. Personnel shall not be lifted with a line hoist or friction crane.

g. Portable fire extinguishers shall be inspected, maintained, and recharged as specified in NFPA 10, Standard for Portable Fire Extinguishers.

h. All employees shall be kept clear of loads about to be lifted and of suspended loads.

i. The Contractor shall use cribbing when performing lifts on outriggers.

j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

k. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

l. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

m. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by Contracting Officer personnel.

n. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

3.5 EXCAVATIONS

The competent person shall perform soil classification in accordance with 29 CFR 1926.

3.5.1 Utility Locations

Prior to digging, the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.

3.5.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within 0.061 m (2 feet) of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 30.5 m (100 feet) if parallel within 1.5 m (5 feet) of the excavation.

3.5.3 Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding shall have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

3.5.4 Trenching Machinery

Trenching machines with digging chain drives shall be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers shall be provided training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Documentation of the training shall be kept on file at the project site.

3.6 UTILITIES WITHIN CONCRETE SLABS

Utilities located within concrete slabs and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with station utility departments in addition to a private locating service. Outages to isolate utility systems shall be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

3.7 ELECTRICAL

3.7.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Station Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In

addition, provide electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

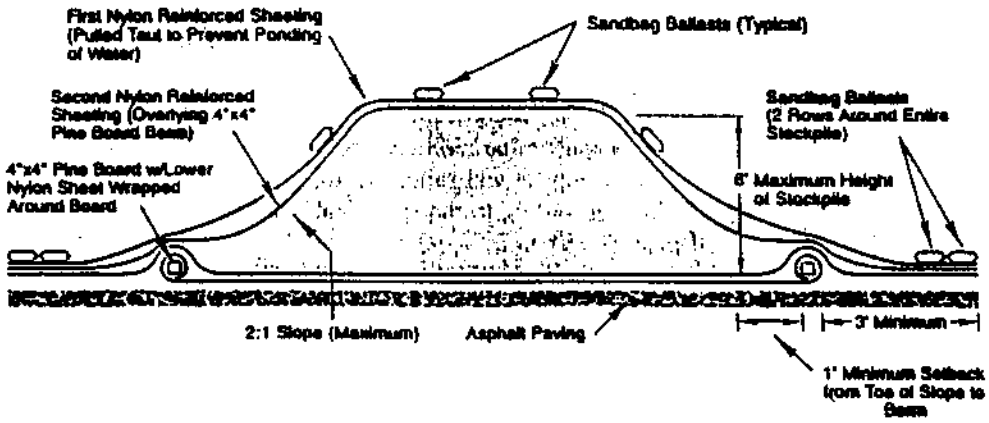
3.7.2 Portable Extension Cords

Portable extension cords shall be sized in accordance with manufacturer ratings for the tool to be powered and protected from damage. All damaged extension cords shall be immediately removed from service. Portable extension cords shall meet the requirements of NFPA 70.

3.8 WORK IN CONFINED SPACES

The Contractor shall comply with the requirements in Section 06.I of USACE EM 385-1-1, OSHA 29 CFR 1910.146 and OSHA 29 CFR 1926.21(b)(6). Any potential for a hazard in the confined space requires a permit system to be used.

-- End of Section --

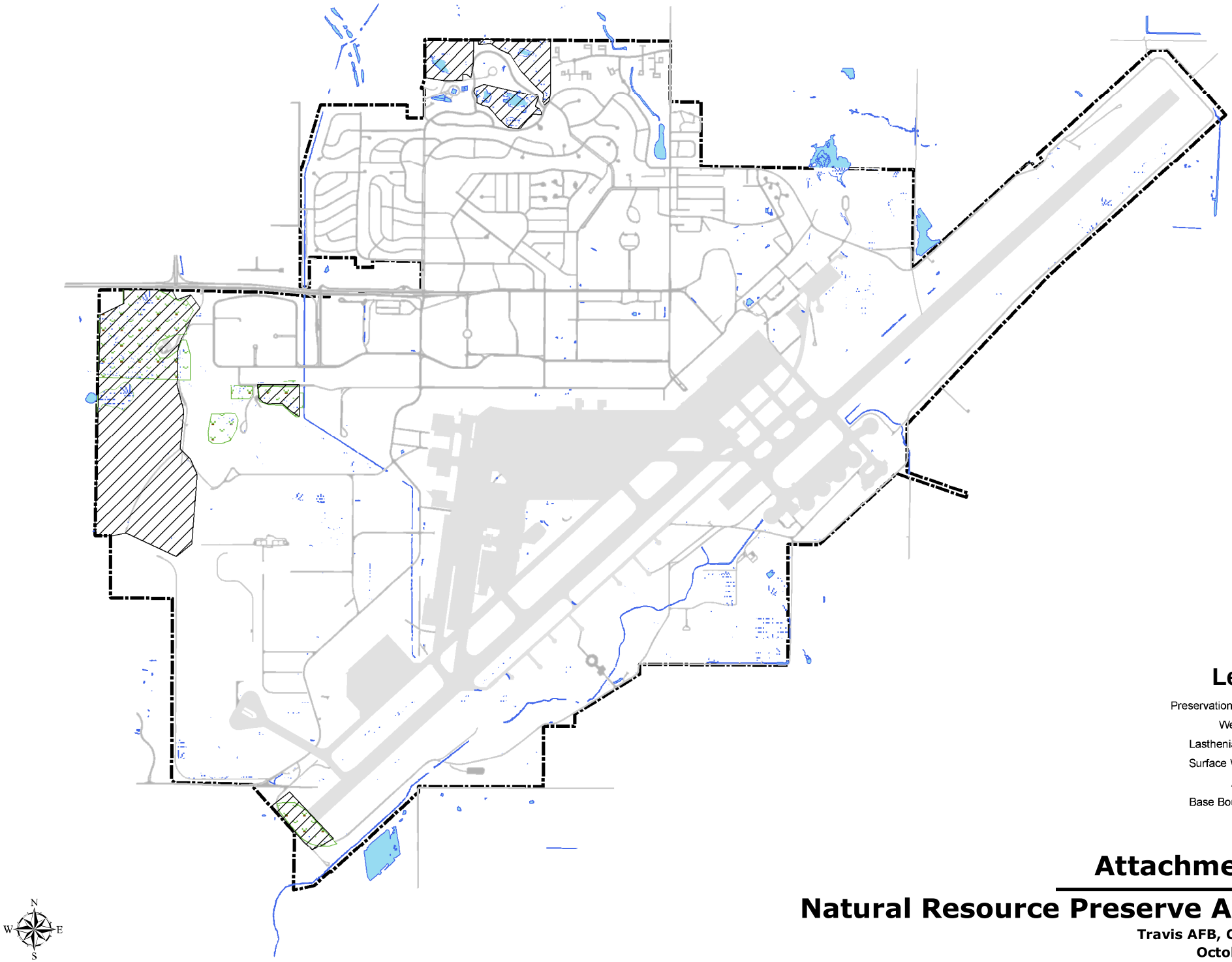


Note: To minimize exposure to the contaminated soil, it is recommended that the stockpile be located in an area that is restricted to the general public (i.e., a fenced area).

Classification of Soil	Bottom HDPE When Supported by Asphalt or Concrete	Bottom HDPE When Not Supported by Asphalt or Concrete	Top Cover HDPE
Hazardous	20 MILL	60 MILL	6 MILL
Contaminated	6 MILL	6 MILL	6 MILL
Clean	N/A	N/A	N/A

Temporary Staging of Contaminated Soil

Attachment 1



Attachment 2

Natural Resource Preserve Areas

Travis AFB, California
October 2005

SECTION 01560

ENVIRONMENTAL GENERAL REQUIREMENTS

PART 1 GENERAL 4
1.1 REFERENCES 4
1.2 SUBMITTALS 4
1.3 NOTIFICATION OF NON-COMPLIANCE 4
1.4 SUBCONTRACTORS 4
1.5 ENVIRONMENTAL PERMITS AND CERTIFICATIONS 4
1.6 ENVIRONMENTAL FINES AND PENALTIES 5
1.7 DEFINITIONS 5
PART 2 PRODUCTS (NOT APPLICABLE) 10
PART 3 EXECUTION 10
3.1 GENERAL ENVIRONMENTAL REQUIREMENTS 10
3.1.1 Open Burning 10
3.1.2 Historical and Archeological Findings 10
3.1.3 Unidentified Materials 10
3.2 SOLID WASTE MANAGEMENT 12
3.2.1 References 12
3.2.2 Submittals 12
3.2.3 Management of Solid Waste 12
3.3 HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT 13
3.3.1 References 14
3.3.2 Submittals 14
3.3.3 Base HAZMART 14
3.3.4 Coordination Process for HAZMAT usage on Base 14
3.3.5 Bar-Coding/Tracking HAZMAT 15
3.3.6 Tracking Usage of HAZMAT 15
3.3.7 HAZMAT Storage 16
3.3.8 Best Management Practices (BMPs) 16
3.3.9 Spill Control and Clean Up 17
3.4 STORM WATER POLLUTION PREVENTION 17
3.4.1 References 17
3.4.2 Submittals 17
3.4.3 Permits 18
3.4.4 Water 19

3.4.5 Correspondence 21
3.4.6 Sampling and Analyses 21
3.4.7 Wetlands 21
3.5 PETROLEUM OIL AND LUBRICANT (POL) USE AND MANAGEMENT 22
3.6 NATURAL AND CULTURAL RESOURCES 22
3.6.1 References 22
3.6.2 Submittals (RESERVED) 22
3.6.3 Protection of Landscape Features 22
3.6.4 Restoration of Damage to Landscape Features 23
3.6.5 Project Site Access 23
3.6.6 Temporary Excavation and Embankments 24
3.6.7 Post Work Cleanup 24
3.6.8 Cultural Resources 24
3.6.9 Land Use Controls 24
3.7 AFFIRMATIVE PROCUREMENT 24
3.7.1 References 25
3.7.2 Submittals 25
3.7.3 Certification 25
3.8 HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT 26
3.8.1 Reference 26
3.8.2 Submittals 26
3.9 SOIL MANAGEMENT 27
3.9.1 Soil Management 27
3.9.2 Soil Handling 27
3.9.3 Segregation of Contaminated Soil 27
3.9.4 Backfill 28
3.9.5 Stockpiling 28
3.9.6 Soil Characterization 28
3.9.7 Disposal 28
3.9.8 Dumping 28
3.10 AIR QUALITY 28
3.11 PESTICIDES 29
3.11.1 References 29
3.11.2 Submittals 29
3.11.3 Approval 29
3.11.4 Applicator Certification 29
3.11.5 Storage 29

3.11.6 Usage Report 30
3.11.7 Disposal 30
3.12 RADIOACTIVE MATERIAL (RAM) 30
3.12.1 List of Items Containing RAM 30
3.12.2 Radiation Emitters 30
3.12.3 Ionizing Emitters 31
3.12.4 Non-Ionizing Emitters 31
3.12.5 Laser 31
3.13 FLUORESCENT LIGHT TUBES AND HIGH INTENSITY DISCHARGE (HID) LAMPS 31
3.14 SPILLS 32

ATTACHMENT 1 – TEMPORARY STAGING OF CONTAMINATED SOIL

ATTACHMENT 2 – MAP OF NATURAL RESOURCE PRESERVE AREAS ON TRAVIS AFB

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01560

ENVIRONMENTAL GENERAL REQUIREMENTS

PART 1 GENERAL

The work covered by this Section consists of performing all work required for the prevention of environmental pollution on Travis AFB during, and as a result of, construction or service contract operations under this Contract. The control of environmental pollution requires consideration of the effects of the activities of the Contractor on air, water, and land resources and base-wide facility, utility and real property assets.

1.1 REFERENCES

The Contractor and all subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and protection, as well as the specific requirements included or referenced under these stated elsewhere in the Contract Specifications.

1.2 SUBMITTALS

Submittal requirements for this section are outlined in specific subsections.

1.3 NOTIFICATION OF NON-COMPLIANCE

Upon receipt of written notification on noncompliance from the Contracting Officer, the Contractor shall immediately take corrective action as directed by the Contracting Officer. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. All costs associated with the correction and suspension of work shall be the sole responsibility of the Contractor.

1.4 SUBCONTRACTORS

The requirements of these specifications shall be included in any subcontract written under this Contract. Compliance with the provisions of the specifications by subcontractors shall be the responsibility of the Contractor.

1.5 ENVIRONMENTAL PERMITS AND CERTIFICATIONS

The Contractor is responsible for obtaining all applicable environmental permits and certifications necessary to accomplish all work. Requirements for specific permits and certifications are included in subsequent subsections.

1.6 ENVIRONMENTAL FINES AND PENALTIES

The Contractor agrees to indemnify the Government, its officers, agents, and employees against liability and costs associated with the intentional or negligent noncompliance of environmental laws, regulations, or requirements by the Contractor, its officers, agents, employees, or subcontractors to the extent such noncompliance arises out of the manufacture or delivery of supplies, services or construction by or for the account of the Government.

1.7 DEFINITIONS

1.7.1 Accumulation

The temporary holding of hazardous waste during waste generation activities for a specific limit of time past the accumulation start date.

1.7.2 Air Pollution

The generation and/or release to the atmosphere of one or more air contaminants, as defined in 40 CFR 50, in the outdoor atmosphere in excess quantities of regulatory thresholds, or for a duration of time, that is determined by the Contracting Officer or his authorized representative, to be injurious to human health or which unreasonably interferes with enjoyment of life or use of property.

1.7.3 Bill of Lading

A shipping document containing information required by DOT for commodities and hazardous materials.

1.7.4 Conditionally Exempt Small Quantity Generator

There are no conditionally exempt small quantity generators on Travis AFB. All hazardous waste; to include Contractor-generated hazardous waste, must be properly handled, stored, and disposed in accordance with the Travis AFB Hazardous Waste Management Plan.

1.7.5 Container

Title 22, Section 66260.10 defines a container as "any device that is open or closed, and portable in which a material can be stored, handled, treated, transported, recycled, or disposed of." Containers include portable tanks. Title 13, Section 1160.3(j) defines containers as any covered or uncovered receptacle to be used for transporting hazardous waste and having a capacity greater than 110 U.S. gallons (416.4 liters).

1.7.6 Characteristic Waste

Wastes are considered hazardous if containing one of the following characteristics: ignitable, corrosive, reactive or toxic. Note that California's criteria for corrosive and toxic wastes are more inclusive than USEPA.

1.7.7 Disposal

Disposal is defined as the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into the waters, including ground water.

1.7.8 Disposal Facility

A facility or part of a facility at which hazardous waste is intentionally placed into or on any land or water, and at which waste will remain after closure.

1.7.9 Disposal Site

The location where any final deposition of hazardous waste occurs.

1.7.10 Dust

Minute solid particles caused to be suspended by natural forces or by mechanical processes such as, but not limited to, the following operations: crushing, grinding, milling, drilling, demolishing, shoveling, conveying, covering, bagging, mixing, general vehicle operations and sweeping.

1.7.11 Environmental Pollution

The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic or recreational purposes.

1.7.12 Excluded Hazardous Waste

Any hazardous waste or mixture of hazardous wastes in which a significant percentage of the waste is recycled and reused at the same location the waste is originally generated. Excluded Recyclable Materials must be labeled and properly managed while being accumulated on site.

1.7.13 Extremely Hazardous Waste

The list of extremely hazardous wastes is provided in Title 22, CCR Section 66261.110.

1.7.14 Generator or Producer

Any person, by site, whose act or process produces hazardous waste, identified or listed in 40 CFR Part 261 or Chapter 11 of Title 22 CCR or whose act first causes a hazardous waste to become subject to regulation. Travis AFB is the generator for hazardous wastes generated on Base.

1.7.15 Hazardous Constituent

Hazardous constituent (a) constituent identified in Appendix VIII to Chapter 11 of CCR Section C; (b) any other element, chemical compound, or mixture of compounds which is a component of a hazardous waste or leachate and which has a physical or chemical property that causes the waste or leachate to be identified as a hazardous waste.

1.7.16 Hazardous Material (Hazmat)

Any substance defined by OSHA as a hazardous substance requiring a Material Safety Data Sheet, including, but not limited to, any chemicals, paints, adhesives, sealing compounds, strippers, glues, petroleum products, natural or synthetic gases, pesticides and all compounds containing hazardous substances.

1.7.17 HAZMART

The HAZMART is the central issuing, storing, and tracking function for all hazardous materials used on Travis AFB.

1.7.18 Hazardous Waste (HW)

A waste is hazardous if it listed as a hazardous waste or exhibits one or more of the following characteristics as defined in 40 CFR Part 261 and Section 66261.3 of Title 22 CCR: Ignitability, Corrosivity, Reactivity, and/or Toxicity.

1.7.19 Incompatible Waste

A hazardous waste which is unsuitable for (a) placement in a particular device or facility because it may cause corrosion or decay of containment materials (e.g. container inner liners or tank walls); (b) commingling with another waste or material under uncontrolled conditions because the commingling might produce heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes, or eases.

1.7.20 Manifest

The shipping document DTSC 8022A, or the equivalent document required by the state to which the waste will be shipped, which is originated and signed by the generator in accordance with the instructions included in the appendix to Chapter 12 of Title 22 CCR.

1.7.21 Natural Resources

All plants, animals, and ecosystems existing within the boundaries of Travis AFB.

1.7.22 Non-RCRA Hazardous Waste

All hazardous waste regulated in the State of California pursuant to Title 22 CCR, Section 66261.101 excluding waste regulated by the Resource Conservation and Recovery Act (RCRA) as defined in 40 CFR 261.

1.7.23 Open Burning

Any outdoor fire from which the products of combustion are emitted directly into the open air without passing through a stack, chimney, or duct.

1.7.24 Particulate Matter

Any material, liquid or solid, other than water, which is suspended in air or other gases.

1.7.25 Post-Consumer Material

Any material or finished product that has served its intended use and has been discarded for disposal or recovery having completed its life as a consumer item.

1.7.26 RCRA

Resource Conservation and Recovery Act (RCRA) is the federal statute used to regulate facilities that generate, treat, store, or dispose of hazardous waste.

1.7.27 RCRA Hazardous Waste

All RCRA hazardous wastes are identified in Part 261 of Title 40 of the Code of Federal Regulations and Title 22 CCR, Section 66261.100.

RCRA hazardous waste typically meets the characteristics of ignitability, corrosivity, reactivity, or toxicity; is a listed hazardous waste in CCR Article 4 and not excluded from 40 CFR Part 261, Subpart D by the USEPA pursuant to 40 CFR Sections 260.20 and 260.22; or is identified as a hazardous waste pursuant to Title 22 CCR Sections 66261.3 (a)(2)(B), 66261.3(a)(2)(D), 66261.3(a)(2)(B), or 66261.3(c)(2). A hazardous waste is presumed to be RCRA hazardous waste unless or until a generator determines that the waste is non-RCRA hazardous waste regulated under California law pursuant to Section 66261.101.

1.7.28 Recovered Material

Waste materials and by-products that have been recovered or diverted from solid waste, but not including those materials and by-products generated from, and commonly reused within, an original manufacturing process.

1.7.29 Recyclability

Ability of a product or material to be recovered from, or otherwise diverted from, the solid waste stream for the purpose of recycling.

1.7.30 Recyclable Material

A solid waste that is capable of being recycled, including, but not limited to, any of the following: (a) a residue; (b) a spent material, including but not limited to a used or spent stripping or plating solution or etchant; (c) material that is contaminated to such an extent that it can no longer be used for the purpose for which it was originally purchased or manufactured; (d) a byproduct listed in Section 66261.31 or Section 66261.32 Title 22 CCR; (c) any retrograde material that has not been used, distributed, nor reclaimed through treatment by the original manufacturer or owner by the later of the following dates: (1) one year after the date the material became a retrograde material; (2) if the material has been returned to the original manufacturer, one year after the material is returned to the original manufacturer.

Any material designated by 60 CES/CEV as of the date of this Contract as having recyclable value and can be collected to reclaim that value. Typical recyclable materials include, but are not limited to: aluminum cans, asphalt, , books, ceiling tiles, construction debris, corrugated cardboard, copper tubing, , magazines, newspapers, office paper, used oil, metal cans, plastic bottles, glass bottles, scrap metals, , tires, wire/metal cable and wood pallets.

1.7.31 Recycling

The series of activities, including collection, separation and processing, by which products or other materials are recovered from the solid waste stream for use in the form of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion.

1.7.32 Residue

The hazardous materials remaining in a packaging, including a tank ear, after its contents have been unloaded to the maximum extent practicable and before the packaging is either refilled or cleaned of hazardous materials and purged to remove any hazardous vapors.

1.7.33 Satellite Accumulation

Under Federal and State Law, a generator may accumulate up to 55 gallons of hazardous waste (or one quart of acutely or extremely hazardous waste) without a permit at the initial point of accumulation for up to one year, provided specific requirements are met. Not considered storage, see Title 22, CCR, Sections 66262.34(e)(1)(B) and 66262.35.

1.7.34 Solid Waste

Solid Waste is any discarded material. While there are some regulatory exclusions in 40 CFR 261.4(a),if these materials exhibit any characteristic of hazardous wastes under Title 22 CCR, Division 4.4, Chapter 11, Article 3, they may be regulated as California non-RCRA hazardous wastes under 22 CCR 66261.101(b)(2).

Thus, a Solid Waste is any material, liquid, gaseous or solid, that is deemed as waste because it is no longer needed, is excess, has exceeded its shelf life, is spill residue, has been abandoned, or is no longer usable for its intended purpose.

Solid waste also includes, but is not limited to: chemicals, contaminated clothing, empty containers, garbage, packaging, construction and demolition debris, refuse and all other discarded materials that are generated during construction, industrial, residential, and commercial activities.

1.7.35 Spill

Any unauthorized or unpermitted release of a hazardous material outside of the primary container. The spill could be due to human error, faulty equipment, failed containers, or natural mishap.

1.7.36 Storage

The containment of hazardous waste, either for a temporary period or for a period of a year or potentially longer, in such a manner as not to constitute disposal or use of such hazardous waste.

1.7.37 Tank

A stationary device designed to contain an accumulation of hazardous waste which is constructed primarily of nonearthen materials (e.g., wood, concrete, steel, plastic) which provide structural support. A “portable tank” (without structural support, etc.) is defined as a container.

1.7.38 Treatment

Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character, composition of any hazardous waste so as to neutralize such waste or as to render such waste non-hazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume. This includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it non-hazardous.

1.7.39 Universal Waste

Universal wastes are hazardous wastes that must be managed in compliance with the standards defined in 22 CCR, Division 4.5, Chapter 23 to avoid being managed under the stringent standards of other hazardous wastes. Examples of “universal” waste are:

a. a. Batteries (22 CCR 66273.2)

b. b. Mercury switches and thermostats (22 CCR 66273.4)

c. c. Lamps (22 CCR 66273.5)

d. d. Non-empty aerosol cans.

1.7.40 Vernal pool

A vernal pool is type of seasonal wetland that occurs in California's grasslands where soils are poorly drained. These pools are full of water in the winter rainy season and dry up in the spring and remain dry throughout the summer and most of the fall. Vernal pools on Travis AFB are protected federal wetlands and must not be disturbed. Additionally, vernal pools harbor many rare species of plants and animals, some of which are protected under the Endangered Species Act.

1.7.41 Waste Prevention

Any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they are discarded. Waste prevention also refers to the reuse of products or materials.

1.7.42 Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, vernal pools, and similar areas.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL ENVIRONMENTAL REQUIREMENTS

3.1.1 Open Burning

The Contractor is prohibited from open burning on Travis AFB.

3.1.2 Historical and Archeological Findings

If the Contractor has a reasonable suspicion he or she has discovered any item (bones, artifacts, structures, etc.) or area of historical or archaeological interest not specified in the Contract during the completing of work, the Contractor shall leave the area undisturbed, render it safe for and from workers and the public, and immediately report the finding to the Contracting Officer.

3.1.3 Unidentified Materials

3.1.3.1 Asbestos Containing Material (ACM)

3.1.3.1.1 If the Contractor believes they have discovered any ACM not specified in the Contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer.

3.1.3.1.2 Refer to Specification Section 01000-1.26 for a discussion of potential ACM associated with Orangeburg Conduit installed at Travis AFB. Sample testing of select conduits for asbestos fibers was conducted as part of

the design analysis. Test results indicate the presence of asbestos fibers in some of the conduits. The Orangeburg conduit asbestos test report is included as Attachment A.

3.1.3.2 Lead-Based Paint (LBP)

If the Contractor believes they have discovered any LBP not specified in the Contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer.

3.1.3.3 Polychlorinated Biphenyls (PCBs)

If the Contractor believes they have discovered a PCB containing item not specified in the Contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer. The Contractor shall not use or install any equipment containing PCBs on Travis AFB.

a. Contractors are responsible for properly managing of PCBs and waste generated from PCB contaminated materials including light ballast's. Proper management includes but is not limited to handling, marking, labeling, packaging, transporting, and disposing of PCBs. When managing PCBs, the Contractor must follow federal, state, and local standards. The Code of Federal Regulations (40 CFR 761) outlines procedures for handling PCBs above 50 parts per million (ppm). California also regulates PCBs as hazardous waste above five (5) ppm.

b. Because the danger PCBs pose to human health, Contractors shall ensure measures are in-place to prevent injury to personnel, accidental releases, and environmental contamination. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the Contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Waste PCB material cannot remain on-site for more than 90 days. While in storage, contractors shall comply with all applicable requirements that govern PCB hazardous waste management. A representative from 60 CES/CEV must sign all manifests for PCBs destined for disposal. The Contractor must provide laboratory analysis for all manifested PCBs.

c. Sample testing of select transformers for PCBs-contaminated oil was conducted as part of the design analysis. Test results indicate the presence of detectable levels of PCBs in some transformers. The transformer oil sample test report is included as Attachment B. The Contractor shall conduct PCBs testing for all oil-filled transformers and switches scheduled for demolition and disposal under this Contract.

3.1.3.4 Transformers

The Contractor shall not use or install any equipment containing PCBs on Travis AFB.

3.1.3.5 Building Demolition and Renovation

Contractors must comply with Travis AFB Instruction 32-109, paragraphs 3.6 through 3.17.1 before demolition starts and paragraph 4.10.1 and all of section 5 when demolition is complete.

3.1.3.5.1 Buildings shall not be demolished without prior coordination with 60 CES/CEVP.

3.1.3.5.2 Buildings shall not be demolished or renovated without prior surveys for asbestos materials, lead base paint, PCBs, and other hazardous materials.

3.1.3.5.3 Contractors shall obtain the Contracting Officer's written approval to proceed in advance of any demolition or renovation.

3.1.3.5.4 There shall be no visible emissions from the work site during demolition or renovation.

3.2 SOLID WASTE MANAGEMENT

The Contractor is authorized to generate or dispose of solid waste under the scope of this Contract in accordance with this section.

3.2.1 References

a.	Integrated Solid Waste Management Plan	*Travis AFB Solid Waste Management Plan* (Most Current Version)
b.	Executive Order 13101	Greening of the Government Through Waste Prevention, Recycling and Federal Acquisition (16 Sep 98)
c.	CCR Title 14, Division 7, Chapter 3.0, Article 5.9	California Integrated Waste Management Board

3.2.2 Submittals

3.2.2.1 Landfill, Recycling Facility & Transporter Information

3.2.2.2 Weight Receipts for Solid Waste Disposed and Materials Recycled

3.2.3 Management of Solid Waste

3.2.3.1 The Contractor shall be responsible for collecting all solid wastes generated under the scope of this Contract. All Construction and Demolition debris (C&D) shall be recycled either onsite or at a C&D recycling facility. The Contractor shall segregate recyclable wastes (i.e. copper piping, asphalt , concrete, lumber, plastics, ceiling tiles, all scrap metal, etc.) and universal wastes (fluorescent lamps, ballasts, batteries, etc). Non-recyclable solid waste generated under the scope of this Contract shall be taken to an approved landfill.

3.2.3.2 The Contractor shall determine the location of the recycling and/or disposal facilities to be used for all materials recycled and/or disposed of which will be generated from the work performed under this Contract, as well as their method of transport. Within ten (10) calendar days after the Notice to Proceed (NTP), the Contractor shall submit the Landfill, Recycling Facility & Transporter Information (Submittal 3.2.2.1) including name, address, and phone number for each of the chosen facilities and transporters to the Contracting Officer for approval.

3.2.3.3 The Contractor shall collect all solid wastes generated during the performance of the Contract in a container/area provided by the Contractor and approved by the Contracting Officer. The Contractor shall provide appropriate containers for the collection and segregation of solid wastes, recyclables, and C&D debris generated directly and indirectly by work under this Contract. The Contractor is prohibited from using base dumpsters or other waste receptacles for the disposal of any solid wastes. All solid wastes shall be reclaimed, recycled, or disposed of prior to completion of work on Travis AFB.

3.2.3.4 As proof of proper disposition of solid wastes, the Contractor shall provide legible Weight Receipts for Solid Waste Disposed and Materials Recycled (Submittal 3.2.2.2) bearing the name, address, and phone number of the receiving facilities for every load of materials delivered. The weight

ticket shall detail the type of material, weight of the material in pounds, the date of the transaction, and a signature from a representative of the receiving facility. Receipts shall be submitted to the Contracting Officer within ten (10) calendar days after the transaction.

3.3 HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT

The Contractor is authorized to use hazardous materials under the scope of this Contract in accordance with this section.

3.3.1 References

a.	AFI 32-7086	Air Force Instruction, *AMC Supplement 1 Hazardous Material Management* (December 1998)
b.	Spill Contingency Plan Travis AFB	*Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response* (Most current version)

3.3.2 Submittals

3.3.2.1 Contractor Information Sheet(s)

3.3.2.2 Material Safety Data Sheets (MSDSs)

3.3.2.3 Substantiating Documentation for Use of Specific HAZMAT

3.3.2.4 HAZMAT Usage Log

3.3.2.5 Contractor's Field Location Sketch

3.3.3 Base HAZMART

The Contractor shall participate in the Base HAZMART program to the extent described in this Contract as required by AFI 32-7086, AMC Supplement 1. Participation shall include:

a. Designation of a single individual who has experience and knowledge of HAZMAT issues

b. Provision of MSDSs for all HAZMAT to be used or stored on base

c. Limited storage of HAZMAT on base

d. Coordination of all HAZMAT used or stored on base from the Base HAZMART; to include HAZMAT bar-coding and tracking

e. Tracking daily usage of all HAZMAT used or stored on base

f. Implementation of Best Management Practices (BMPs) to prevent spills and other releases to the environment to meet NFPA, OSHA, and RCRA requirements

g. Participation in an accurate exit inventory of materials used on base at the end of the Contract

3.3.4 Coordination Process for HAZMAT usage on Base

3.3.4.1 Within ten (10) days of the NTP, the Contractor shall submit to the Contracting Officer a completed copy of the Contractor Information Sheet (Submittal 3.3.2.1) listing all HAZMAT to be used and approximate quantities to be used prior to beginning work. The Contracting Officer will provide a blank Contractor Information Sheet to the Contractor at the preconstruction meeting. Within ten (10) days of the NTP, the Contractor shall also submit to the Contracting Officer one (1) legible copy of the most current MSDSs (Submittal 3.3.2.2) for each HAZMAT item to be used during the performance of work under this Contract. As soon as the coordination is completed, the Contractor may bring bar-coded HAZMAT onto Travis AFB. The Contractor is prohibited from bringing HAZMAT onto Travis AFB prior to receiving bar-codes from the Base HAZMART.

3.3.4.2 Substantiating Documentation (Submittal 3.3.2.3) for the use of any HAZMAT required to complete work shall be submitted with the MSDS if the HAZMAT contains any of the following:

a. Phosphates or Phosphate Compounds of any kind

b. EPA 17 Toxic Chemicals; Ozone Depleting Chemicals (ODCs)

c. High Volatile Organic Compounds (VOCs)

d. CERCLA 102(a) Extremely Hazardous Substances (EHSs)

e. Hazardous Air Pollutants (HAPs).

3.3.4.3 Substantiating documentation shall include a review of available, less hazardous HAZMAT options and all qualifying reasons why they cannot be used.

3.3.4.4 Without substantiating documentation and review of less hazardous options, approval for use of the HAZMAT may not be granted.

3.3.4.5 The Contractor shall maintain a current MSDS on Base for each HAZMAT item at the site where the HAZMAT is being stored or used, and shall make the MSDSs available for inspection upon request from the Contracting Officer.

3.3.5 Bar-Coding/Tracking HAZMAT

3.3.5.1 The Contractor shall contact the Base HAZMART (707-424-2689) between 0800 hours and 1400 hours within 1 hour of bringing approved HAZMAT onto the base for use to arrange for bar-coding of all HAZMAT.

3.3.5.2 The Base HAZMART manager will compare the HAZMATs to those listed on submittals 3.3.2.1: Contractor Information Sheet(s) and 3.3.2.2 Material Safety Data Sheets (MSDSs) to ensure they are exactly the same. If they do not match, the HAZMAT cannot be bar-coded until authorized per paragraph 3.3.4.1. The Base HAZMART manager will then issue barcodes to be placed on each HAZMAT container. The Contractor shall ensure that all hazmat containers are bar-coded prior to transporting hazmat on base. Barcodes shall not be destroyed, mutilated, covered, or otherwise made illegible to a barcode reader by the Contractor prior to the exit inventory for the HAZMAT. If additional HAZMAT is brought onto the base after initial registration, the Contractor shall contact the Base HAZMART and request bar-coding immediately.

3.3.5.3 Unregistered HAZMAT (containers without a HAZMAT barcode) will be reported to the Contracting Officer upon discovery, the Contractor may be directed to stop work and remove any unregistered hazardous materials from the base.

3.3.6 Tracking Usage of HAZMAT

3.3.6.1 Contractor shall maintain a daily Usage Log for each HAZMAT item authorized and used on the project.

3.3.6.2 The Usage Log shall indicate the stock number, name of the material, the date used and the quantity used in units of measurement consistent with the volume units identified on the container (i.e. if the container is marked in ounces, the Usage Log shall indicate usage in ounces). The log shall also include dates of spillage or waste (when applicable).

3.3.6.3 Empty HAZMAT containers shall be marked on the Log as "Empty" on the date it was used. When empty containers have been generated, the Contractor shall notify the Base HAZMART via telephone (707-424-2689) and shall provide the barcode number of the used materials. The Contractor is responsible for ensuring all empty containers are removed from the base and disposed of (or

recycled) in accordance with section 3.2 Solid Waste Management and section 3.8 Hazardous Waste Management.

3.3.6.4 The HAZMAT Usage Log (Submittal 3.3.2.4) shall be made immediately available for review upon verbal request from the Contracting Officer. All usage logs shall be submitted to the Contracting Officer weekly (no later than Monday of the following week). Usage logs should only record one week's usage at a time.

3.3.6.5 The Contractor shall contact the Base HAZMART Manager to arrange an exit inventory to be completed by the Base HAZMART Manager as soon as HAZMAT items are no longer needed on site and prior to disposal or transport off base. HAZMAT shall not be disposed of, or transported off base, prior to the exit inventory.

3.3.7 HAZMAT Storage

3.3.7.1 The Contractor shall store all HAZMAT in a designated HAZMAT storage area. The Contractor shall anticipate receiving at least one assessment during the Contract period to ensure their HAZMAT storage area is in compliance with HAZMAT storage requirements outlined in this section.

3.3.7.2 The Contractor shall ensure that all Best Management Practices in paragraph 3.3.8 of this section are in place while HAZMATs are being used or stored on base.

3.3.7.3 The Contractor shall provide secondary containment for all HAZMAT being stored and used on base. Secondary containment shall be chemically inert to the HAZMAT being stored and impervious to absorption of the HAZMAT. The containment volume shall not be less than 110% of the total quantity stored in the single largest container. Separate secondary containment shall be provided for incompatible HAZMAT.

3.3.7.4 The location on Government Property of the Contractor's field office, storage and other facilities required for the performance of the work shall be upon cleared areas of the job site, areas to be cleared, or other areas designated by the Contracting Officer. The Contractor shall submit a sketch showing the location of the areas designated for temporary field offices, equipment storage, material storage and staging. The sketch shall be submitted for government review prior to commencement of work. The preservation of the landscape shall be an imperative consideration in the selection of all sites. No activity shall be conducted or storage permitted within the drip line of any tree without being depicted on the drawings and being approved by the Contracting Officer

3.3.8 Best Management Practices (BMPs)

3.3.8.1 NFPA and OSHA required or specified flammable material and corrosive material storage lockers shall be used for the storage of all HAZMAT.

3.3.8.2 The Contractor shall ensure that the segregation of incompatible materials is accomplished at all times in his or her field office, storage, staging, and work areas.

3.3.8.3 Ensure the use of protective measures such as drop cloths and tarpaulins when using HAZMAT to keep the work and storage areas free from drips and spills.

3.3.8.4 Keep all containers closed when not in use. At the end of the workday, or when finished using any material, return the container to a proper storage area.

3.3.8.5 Do NOT store HAZMAT outdoors where it can be exposed to precipitation.

3.3.8.6 Follow all manufacturers' recommendations for storage and use of HAZMAT.

3.3.8.7 Ensure that all employees are given proper training in the use of the HAZMAT onsite and all personal protective equipment necessary for the use of HAZMAT on Travis AFB.

3.3.8.8 MSDSs for each HAZMAT item being used are required by OSHA to be available onsite to employees. The Contractor shall have current copies available at all times where employees can access them in case of emergency.

3.3.9 Spill Control and Clean Up

The Contractor shall be responsible for the cleanup and disposal of all spilled materials whether or not they are HAZMAT. This includes all materials use to contain and absorb the spill. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the Contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Spills of HAZMAT or hazardous waste shall be managed in accordance with the current 60 AMW Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response for Travis AFB. Disposal of wastes generated from spill cleanup shall be the Contractor's responsibility and be in accordance with paragraph 3.2 and 3.8 of this section.

3.4 STORM WATER POLLUTION PREVENTION

The Contractor may be required to perform land disturbing activities and facility work under the scope of this project. The Contractor shall comply with a government approved, site specific Storm Water Pollution Prevention Plan including all erosion control practices, best management practices, housekeeping, and storage requirements included within.

3.4.1 References

a. State Water Resources Control Board Water Quality Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) Permit For Discharges of Storm Water Runoff Associated With Construction Activities.

b. State Water Resources Control Board Water Quality Order No. 97-03-DWQ, National Pollutant Discharge Elimination System (NPDES) Permit for Discharges Associated With Industrial Activities.

c. Fairfield-Suisun Sewer District Permit #433-02

d. Fairfield-Suisun Sewer District Local Ordinance #91-1

e. San Francisco Bay Basin Plan Objectives

3.4.2 Submittals

3.4.2.1 Site Specific Storm Water Pollution Prevention Plan

3.4.2.2 Notice of Intent

3.4.2.3 Initial Fee

3.4.2.4 Annual Compliance Status Report

3.4.2.5 Notice of Termination

3.4.3 Permits

The Contractor is responsible for providing all submittals in 3.4.2 to the Contracting Officer and ensuring compliance with the general construction NPDES permit.

3.4.3.1 Construction Sites 1 Acre or More

For construction sites which result in soil disturbance of 1 acre or more, or which are part of a larger common plan which totals 1 acre or more, including excavation, lay down area, parking, access roads, soil piles, etc., the Contactor must provide submittals 3.4.2.1 through 3.4.2.3 at least 30 days before construction begins to the Contracting Officer for coordination and submittal to State Water Resources Control Board to obtain a site specific NPDES construction permit. NPDES permits must be obtained prior to start of related construction activities.

3.4.3.1.1 Storm Water Pollution Prevention Plan

The Storm Water Pollution Prevention Plan shall be developed in accordance with guidelines contained in Reference (a), Section A. A copy of this information, titled "STORMWATER POLLUTION PREVENTION PLAN FOR CONSTRUCTION SITES 1 ACRE OR MORE" is available from the Contracting Officer.

3.4.3.1.2 Notice of Intent

The Contractor shall provide Notice of Intent in accordance with Reference (a) Section A. A copy of this information, titled "NOTICE OF INTENT (NOI) TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY, GENERAL INSTRUCTIONS" is available from the Contracting Officer.

3.4.3.1.3 Fee

An initial fee based on the area of ground disturbance must be submitted to the Contracting Officer, along with the Notice of Intent for construction projects which last more than one year. The amount of this fee may be calculated using the State Water Resources Control Board's fee table for construction activities contained in Reference (a).

3.4.3.1.4 Annual Compliance Status Report

Before June of every year, the Contractor shall evaluate the construction site and submit documentation describing the current project status including but not limited to grading, site disturbance, erosion and sediment control practices already in effect. Best Management Practices that will be implemented prior to the next wet season including time schedule, and upcoming events such as project completion, land disturbances, etc shall also be submitted.

3.4.3.1.5 Notice of Termination

Upon completion of the project, The Contractor shall provide all necessary documentation outlined in the Contractor's NPDES permit, including a Notice of Termination (NOT) to the Contracting Officer in order to close out the construction NPDES permit.

3.4.3.2. Construction Sites Less than 1 Acre

For construction sites that result in soil disturbance of less than 1 acre, no site specific NPDES permit is required and no Notice of Intent, Fee, or Notice of Termination need be submitted. However, a site specific Storm Water Pollution Prevention Plan must be submitted to the Contracting Officer at

least 30 days before construction begins. The Contractor is prohibited from beginning land-disturbing activities until the Contracting Officer has approved the SWPPP.

3.4.3.2.1 Storm Water Pollution Plan

The Storm Water Pollution Prevention Plan shall be developed in accordance with guidelines titled "TRAVIS AFB STORMWATER POLLUTION PREVENTION PLAN GUIDELINES FOR CONSTRUCTION SITES LESS THAN 1 ACRE", available from the Contracting Officer.

3.4.4 Water

This paragraph applies to all water impacted by or generated by the construction activity. Discharge of hazardous waste water is not permitted under any circumstances.

3.4.4.1 Storm Water

3.4.4.1.1 For the purpose of this Contract, storm water is defined as rainwater that comes in contact with the construction site, other sites on Travis AFB associated with the construction project and all construction project materials and equipment.

3.4.4.1.2 All storm water discharged to the storm sewer system must meet effluent requirements described in References (a) and (b).

3.4.4.1.3 During the construction phase, the Contractor is responsible for preventing pollutants, i.e. soil erosion, construction material, petroleum products, chemicals etc., from entering the storm drainage system.

3.4.4.1.4 The Contractor shall use "Best Management Practices" in controlling construction site run-off and erosion, including but not limited to proper stockpiling of excavated soils, use of sediment traps, proper storage of material, inspection, monitoring, equipment drip pans, storage and fueling area secondary containment, etc.

3.4.4.2 Contained Storm Water

3.4.4.2.1 Contained storm water is defined as water that collects in secondary containment berms, impoundments, trenches, excavations, foundation footings, etc., as a result of direct rain or surface water run-on.

3.4.4.2.2 Contained storm water is authorized for discharge to the storm sewer system provided it meets 3.4.4.1.2 above.

3.4.4.2.3 Whenever practicable, the Contractor shall discharge contained storm water to a pre-approved permeable area. The Contractor shall discharge at a rate which does not cause erosion or sediment-laden runoff or cause flow onto non-Air Force or non-federally owned properties. Appropriate BMPs shall be used to prevent discharge of sediment-laden storm water to the storm sewer system.

3.4.4.2.4 The Contractor shall only discharge contained storm water during daylight hours. Prior to discharge, the Contractor shall inspect the water for sheen, odor, or discoloration, which might indicate the presence of contaminants.

3.4.4.2.5 Contained storm water that contains a sheen, odor, or discoloration indicating the presence of contaminants must be containerized and properly disposed of as wastewater in accordance with 3.4.4.4.

3.4.4.2.6 The Contractor shall keep a log recording the day of each discharge, the source of water, the approximate quantity, and person performing the discharge.

3.4.4.3 Non-Storm Water

3.4.4.3.1 For the purpose of this Contract, non-storm water shall be defined as spring or ground water; potable water used for hydrostatic testing, fire hydrant flushing, street cleaning, operation, maintenance or testing of potable water systems, pipe flushing and drinking fountain water; atmospheric condensates including refrigeration, air conditioning and compressor condensate; irrigation drainage; and landscape watering.

3.4.4.3.2 Non-storm water discharges are authorized under Reference (a) provided they:

a. Are approved by the Contracting Officer prior to discharge

b. Comply with Section A.9 of Reference (a)

c. Do not cause or contribute to a violation of any water quality standards

d. Do not violate any other provision of the general permit

e. Do not violate any provision of Reference (e)

3.4.4.3.3 Non-storm water discharges are prohibited if water comes from an area of known soil or ground water contamination, or contains a sheen, odor, or discoloration indicating the presence of contaminants, the ground water must be containerized and disposed of as wastewater under 3.4.4.4.

3.4.4.3.4 Non-storm water discharges shall be eliminated or minimized to the extent possible and shall be discharged to a permeable surface whenever practicable and in a manner which does not cause erosion or sediment laden runoff. Appropriate BMPs shall be used as required. All non-storm water discharges shall be approved prior to discharge by the Contracting Officer. Some discharges may require a separate permit or authorization from the Regional Water Quality Control Board with specified controls to be in place prior to or during discharge. All coordination with the Regional Water Quality Control Board shall be through the Contracting Officer.

3.4.4.3.4.1 The Contractor shall only discharge ground water during daylight hours. Prior to discharge, the Contractor shall inspect the water for sheen, odor, or discoloration, which might indicate the presence of contaminants.

3.4.4.3.4.2 The Contractor may discharge water from potable water source used to rinse cement or mortar from mixing equipment or tools to a pervious area provided:

a. The dried residual is removed and disposed of properly.

b. Rinse water and surface runoff exposed to the area do not discharge directly into the storm sewer system.

3.4.4.4 Wastewater

Wastewater is defined as contaminated storm water or any water not meeting the definition of storm water, non-storm water, ground water, or unused potable water, and is prohibited from discharge to any location on Travis AFB without prior approval from the Contracting Officer.

3.4.4.4.1 Discharges to Sanitary Sewer

3.4.4.4.1.1 The Contractor shall obtain written approval from the Contracting Officer prior to discharging to the Travis AFB sanitary sewer system.

3.4.4.4.1.2 Discharge to the Travis AFB sanitary sewer system shall, at a minimum, meet the requirements of References (c) and (d).

3.4.4.4.1.3 The Contractor shall provide the Contracting Officer the following information in writing:

a. Description of source and location of ground water

b. Quantity

c. Potential contaminants

d. Proposed discharge location(s)

e. Proposed discharge date(s)

3.4.4.4.1.4 60 CES/CEVC will evaluate and coordinate the discharge with the Fairfield-Suisun Sewer District and notify the Contractor of any sampling requirements. Sample analyses must be performed by a state certified test laboratory using EPA approved test methods for wastewater. Discharge is prohibited until sample results are approved by 60 CES/CEVC and the Fairfield-Suisun Sewer District. A fee and permit may be required by the Fairfield-Suisun Sewer District.

3.4.4.4.2 Disposal Off Base

3.4.4.4.2.1 Waste water not meeting the criteria in 3.4.4.4.1.2 must be disposed off base in accordance with Section 3.8, "HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT."

3.4.5 Correspondence

The Contractor shall coordinate with the Contracting Officer prior to any correspondence with regulatory agencies.

3.4.6 Sampling and Analyses

3.4.6.1 All sampling and analyses shall be conducted by the Contractor at the Contractor's expense. All analyses shall be performed by State certified test laboratory in accordance with techniques described in 40 Code of Federal Regulations Part 136 and its amendments using analytical methods approved by the EPA in 40 Code of Federal Regulations Part 403.12(g)(4). All laboratory testing results shall be mailed directly to the Contracting Officer from the lab performing the testing.

3.4.6.2 Refer to Specification Section 1400 for additional requirements pertaining to use of test agencies.

3.4.7 Wetlands

If the Contractor believes he/she has encountered federally protected wetlands or vernal pools not specified in the Contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer.

3.5 PETROLEUM OIL AND LUBRICANT (POL) USE AND MANAGEMENT

3.5.1 Contractors are responsible for ensuring compliance with 40 CFR 112 as well as the California Health and Safety Code Chapter 6.67, Section 25270.3 for any aboveground storage tank brought to the base for Contractor's uses. There are no size exemptions on Travis AFB. Requirements include conducting daily visual inspections, proper labeling, secondary containment, proper grounding, etc. Vehicle/equipment filling and storage tank refilling must be monitored continuously and conducted in a manner to prevent spills and overfills.

3.5.2 Fuel storage tanks for refueling of Contractor equipment must be approved by 60 CES/CEVC prior to installation.

3.5.3 Contractors are responsible for spills occurring on their sites or caused by their operations. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the Contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Spills of HAZMAT or hazardous waste shall be managed in accordance with the current 60 AMW Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response for Travis AFB. Disposal of wastes generated from spill cleanup shall be the Contractor's responsibility and be in accordance with this specification.

3.6 NATURAL AND CULTURAL RESOURCES

The Contractor is required to avoid negatively impacting all natural and cultural resources on Travis AFB in accordance with this paragraph. Land resources shall be preserved in their present condition or, if approved by the Contracting Officer, restored to original condition which existed prior to the commencement of work. The Contractor shall confine work activities to areas defined by the specifications and/or drawings and to areas authorized by the Contracting Officer for other operations needed for the Contractor's performance.

3.6.1 References

a.	Travis AFB INRMP	*Travis AFB Integrated Natural Resources Management Plan (INRMP)* (Most Current Version)
b.	Travis AFB CRMP	*Travis AFB Cultural Resources Management Plan (CRMP)* (Most Current Version)

3.6.2 Submittals (RESERVED)

3.6.3 Protection of Landscape Features

3.6.3.1 Vernal pools occur throughout the grasslands and roadsides on Travis AFB and are federally protected wetlands. These seasonal wetlands also contain numerous rare and endangered plant and animal species. For most of the year, these pools are dry and are easily mistaken for unimproved grassland. The grassland areas on base also harbor protected species like the Burrowing owl and the California tiger salamander. These species use burrows in the grassland habitat as nest sites and forage and travel in the grassland areas. Because of the sensitivity of this habitat, the Contractor shall not travel off improved roadways in vehicles, store material or vehicles, dump water or sludge, or in any way disturb these grassland areas. Additionally, there are several areas on Travis AFB that are set aside as Preserves for vernal pools and the endangered species that inhabit them. No work is

permitted in these areas (refer to Attachment 2 of this specification section).

3.6.3.2 All drainages and creeks on Travis AFB are considered jurisdictional wetlands by the USACE. Contractors shall not enter these areas with vehicles or construction equipment nor place fill material into these wetlands under any circumstances without the proper permits (Section 401 and 404 of the Clean Water Act). Examples of fill material include but are not limited to dirt, culverts, trash, rip rap, concrete, and asphalt. Additionally, some roadside ditches may be classified as vernal pools and may harbor endangered plant or animal species and therefore must not be disturbed. When the Contract allows work in proximity to wetlands and/or vernal pools, proper erosion control devices must be installed to protect the wetlands from run off and sedimentation. All erosion control devices must be removed by the Contractor once sufficient natural vegetation is in place to control erosion.

3.6.3.3 Except in areas marked on the drawings to be cleared, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without approval from the Contracting Officer. Trees designated as "to be saved" shall be protected from excavation or filling, storage and parking within the root zone closer than the normal drip line of the tree. No ropes, cables, or guys shall be fastened to or attached to any existing trees for anchorage unless specifically authorized by the Contracting Officer. Where such special emergency use is permitted, the Contractor shall first adequately wrap the trunk with a sufficient thickness of burlap, rags, etc., over which softwood cleats shall be tied before any rope, cable, or wire is attached. The Contractor shall be responsible for repair or replacement due to any damage resulting from such use.

3.6.3.4 Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or activities, to include the root structure within the drip line of the tree, the Contractor shall protect such trees by constructing barriers or placing boards, planks, or poles around them. Monuments, markers, and works of art shall similarly be protected before proceeding with activities near them.

3.6.4 Restoration of Damage to Landscape Features

3.6.4.1 Any trees, vegetation, or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored to its original condition at the Contractor's expense. The Contracting Officer shall approve the manner of restoration to be used, and whether damaged trees shall be treated and healed, replaced or removed and disposed of under requirements for clearing and grubbing. The Contracting Officer will specify whether disturbed grassland sites will be revegetated and what seed mix and mulch application will be used.

3.6.4.2 All scars made on trees not designated to be removed, whether by equipment, contractor operations, or the removal of limbs greater than one inch in diameter, shall be coated as soon as possible with a tree wound dressing, unless otherwise directed by the Contracting Officer. All trimming or pruning shall be performed in a manner approved by the Contracting Officer. The use of axes or climbing spurs shall not be permitted. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving shall be immediately removed and replaced by the Contractor as directed by the Contracting Officer.

3.6.5 Project Site Access

The Contractor shall use only approved roadways and entry points to the project site. Restoration, repair, and general cleanup of any damage to the landscape caused by the Contractor’s activities and/or equipment on or en route to the project site shall be the responsibility of the Contractor. The

Contractor shall repair any damage caused by contract activities or equipment within one week after the completion of the project, or within two weeks when access to an area is either no longer needed or not used for two weeks, restoring the area with appropriate vegetative and/or mulch as required by the Contracting Officer. It is the Contractor's responsibility to prove that continued access is required.

3.6.6 Temporary Excavation and Embankments

If the Contractor proposes to construct temporary roads or embankments in any areas not to receive final grading and/or landscaping under this Contract, he or she shall submit the following to the Contracting Officer for approval:

3.6.6.1 A layout of all temporary roads, excavations, and embankments to be constructed.

3.6.6.2 Plans and cross sections of proposed embankments and their foundations, including descriptions of proposed materials.

3.6.6.3 A Landscape Plan showing the proposed restoration of the area shall be prepared. Removal of any necessary trees and shrubs outside the limits of existing clearing area shall be indicated. The plan shall provide for the obliteration of construction scars so as to create a reasonably natural appearance of the final condition of the project site. No unauthorized road construction, excavation or embankment construction, including disposal areas, are permitted.

3.6.7 Post Work Cleanup

3.6.7.1 The Contractor shall remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stock piles of excess or waste materials, or any other vestiges of work operations as directed by the Contracting Officer. The Contractor shall provide all excavation, filling, and plowing of roadways required to restore the area to near natural conditions and shall restore the area with appropriate vegetation and/or mulch as required by the Contracting Officer.

3.6.7.2 The Contractor shall remove all erosion and sedimentation controls as specified in the Storm Water Pollution Prevention Plan once the site has sufficient vegetation establishment to prevent erosion naturally. This may require the Contractor to return to the site after the work is complete under this Contract in accordance with the warranty provisions of the Contract.

3.6.8 Cultural Resources

If the Contractor believes he or she has discovered any item or area of historical or archaeological interest not specified in the Contract during the completion of work, the Contractor shall leave the area undisturbed and immediately report the finding to the Contracting Officer.

3.6.9 Land Use Controls

The Contractor must not disturb any Air Force property that is subject to Land Use Controls. The Contractor shall confirm with the Contracting Officer that the project site is free from environmental restrictions. All environmental restrictions are defined on the Air Force Form 813 (Request for Environmental Impact Analysis).

3.7 AFFIRMATIVE PROCUREMENT

The Government requires the use of recycle-content and recovered materials and products identified in the EPA's Comprehensive Procurement Guideline (CPG).

All materials and products intended for use within this project must meet the recommended minimum content standards identified in the current CPG and Recovered Materials Advisory Notices (RMANs). If a conflict exists between material specifications elsewhere and affirmative procurement requirements, the Contractor shall immediately notify the Contracting Officer.

3.7.1 References

a.	Executive Order 13101	Greening of the Government Through Waste Prevention, Recycling, and Federal Acquisition (14 Sep 1998)
b.	U.S. EPA's CPG & RMANs	EPA's Comprehensive Procurement Guideline and Federal Register Recovered Materials Advisory Notices. (Currently located at www.epa.gov/cpg)
c.	Affirmative Procurement Plan (APP)	*Travis AFB Affirmative Procurement Plan* (Most current version).

3.7.2 Submittals

3.7.2.1 Certification of Compliance

3.7.3 Certification

3.7.3.1 The Contractor shall provide a written Certification of Compliance in accordance with Executing Order 13101. The certificate shall be signed by the Contractor and shall state the following:

a. The following certification statement: "*I certify that products and materials used on Travis AFB Project Number <Insert Project Number> comply with recommended minimum content standards for recycled materials outlined in Executive Order 13101. Construction materials used on this project contain minimum recycled content outlined in the most current Comprehensive Procurement Guidelines and Recovered Material Advisory Notices*"

b. Itemized list of the construction materials and products used for the Contract covered under this section including manufacturer, vendor , and percent recycled content or the approved exemption for noncompliance.

c. Supporting documentation for approved exemptions on products used in the project that do not meet CPG requirements.

3.7.3.2 The Certification requirement above shall cover at a minimum the following construction materials and products:

a. Asphalt

b. Concrete

c. Bridge Materials (Recycled Plastic Lumber)

d. Bench Materials (Recycled Plastic Lumber)

e. Signage Materials (Recycled Plastic)

3.8 HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT

3.8.1 Reference

a. *Travis AFB Hazardous Waste Management Plan* (Most Current Version)

3.8.2 Submittals

3.8.2.1: Request for Hazardous Waste Treatment

3.8.2.2: Notification of Temporary Satellite Accumulation Point

3.8.2.3: Certification of training

3.8.2.4: Hazardous Waste Manifests, Non-Hazardous Waste Data Forms, Land Disposal Restrictions, Waste Profiles, Laboratory Analyses, and Material Safety Data Sheets

3.8.3 The Contractor is responsible for management and disposal of hazardous waste in accordance with Federal, State, Local, and Base requirements. The Contractor shall obtain an EPA ID number and accept responsibility for waste disposal.

3.8.4 Contractors are responsible for the analysis, characterization, and identification of hazardous wastes generated by their operation. Characterization shall be in accordance with Title 22 of the California Code of Regulations and be subject to 60 CES/CEVC review.

3.8.5 Hazardous waste treatment is not allowed on-site unless the Contractor clearly demonstrates a safe and cost-effective alternative and circumstances offer no feasible alternative. Requests for hazardous waste treatment must be approved and monitored by 60 CES/CEVC. The Contractor is responsible for all costs associated with obtaining applicable permits. Applications for permits will be submitted through 60 CES/CEVC. Contractors shall not contact any regulatory agency without prior approval from 60 CES/CEV.

3.8.6 Contractors must have a working knowledge of both federal and state hazardous waste regulations. California regulations are at times more stringent than federal regulations. Some examples are the regulations dealing with used oil, used antifreeze, used batteries, and used tires. Though classified as hazardous wastes, these items shall be disposed of through a certified recycler, rather than disposed of as a hazardous waste. Another example is the difference in the definition of an empty container. The federal definition allows three percent of the product to remain in the container. In California "empty" means all material must be removed from the container. Empty containers must be labeled as empty with the date clearly marked on the container.

3.8.7 Contractors are subject to the Solano County Department of Resource Management, California Department of Toxic Substances Control, Federal EPA, and Travis Environmental Management Office audits while working on Travis AFB.

3.8.8 The Contractor shall establish a temporary Satellite Accumulation Point with the approval of 60 CES/CEVC and provide certification of proper training to handle hazardous waste. Hazardous waste shall be placed in secured, properly labeled containers provided by the Contractor. Non-hazardous waste shall be placed in other containers provided by the Contractor.

3.8.9 Under no circumstances will the Contractor remove any hazardous waste from Base without ensuring complete and full compliance with all applicable existing environmental laws and regulations. All shipments must be prepared in accordance with Department of Transportation Regulations (40 CFR 172).

3.8.10 Prior to removing transporting or disposing of any hazardous or non hazardous waste from the base the Contractor shall forward hazardous waste manifests, non-hazardous waste data forms, land disposal restrictions, waste profiles, laboratory analyses, and material safety data sheets to 60 CES/CEVC to obtain a review and/or signature as required.

3.8.11 Government-Supplied Information: By exception, the Contractor may elect to utilize Travis AFB's US EPA ID and State Generator's ID numbers. At the Contractor's request, 60 CES/CEVC will provide the base's mailing address, telephone number, appropriate US EPA ID, and state generator's ID numbers to be used on hazardous waste manifests generated at Travis AFB. The Contractor shall ensure this information is correctly annotated on each hazardous waste manifest. All shipments utilizing the Installation's US EPA ID and State Generator's ID numbers, shall be approved for shipment by 60 CES/CEVC.

3.8.11.1 Scheduling: The Contractor shall notify the Contracting Officer or the appointed contract inspector of the requirement for an inspection when the containers are 40 percent full and again when ready for shipment off-base. All documents must be correctly and completely filled out by the Contractor before contacting 60 CES/CEVC for review. All records required for hazardous waste clean up, removal, packaging, waste profiling, transportation and disposal shall be furnished to 60 CES/CEVC by the Contractor. 60 CES/CEVC will assign the Contractor with an authorized individual, to review and/or sign hazardous and non-hazardous waste manifests and other supporting documents. Contractors shall notify the government's Contracting Officer or contract inspector 72 hours in advance to obtain a 60 CES/CEVC review and coordinate signature as required. An appointment may be scheduled with only 24 hours notice if the situation is urgent, such as during spill response/clean up. Sudden realization by the Contractor that removal of accumulated waste is necessary to prevent schedule impact does not justify urgency.

3.8.11.2 Individuals requesting reviews or signatures without an appointment may be turned away until the next available time on the schedule.

3.8.12 If any provision of this section is inconsistent with any applicable laws, regulations, or rules concerning the treatment, storage, or disposal of hazardous or non-hazardous wastes, such laws, regulations, and rules shall control.

3.9 SOIL MANAGEMENT

3.9.1 Soil Management

The Contractor is responsible for management and disposal of all soil in accordance with all federal, state, and local regulations.

3.9.2 Soil Handling

Travis AFB does not have a pre-approved soil handling, staging, or containment area. This applies to both clean and contaminated soil. All soil generated must be managed on the project site.

3.9.3 Segregation of Contaminated Soil

Soil known or suspected to be contaminated shall be segregated and stockpiled separately from clean soil (see Attachment 1 to this specification section). Soil screening can be accomplished using visual inspection, odor detection, Photo Ionizing Detector (PID), or similar approved methodology.

3.9.4 Backfill

Clean soil can be reused for backfill for the associated project site. Contaminated soil cannot be reused for backfill. Relocation and/or stockpiling of either clean or contaminated soil for use elsewhere on Travis AFB is strictly prohibited.

3.9.5 Stockpiling

The Contractor is responsible for maintaining the integrity (protection and containment from spreading and eroding) of soil stockpiles throughout the project duration.

3.9.5.1 Contaminated soil stockpiles shall be underlain and covered as described in Attachment 1, Temporary Stockpiling of Contaminated Soil.

3.9.5.2 For clean soil stockpiles, best management practices must be implemented to prevent storm drain impacts.

3.9.6 Soil Characterization

3.9.6.1 Known or suspected contaminated soil may be identified during the project design or planning process. Laboratory analysis identified as required during the planning process shall be accomplished by the Contractor. Additional analysis may be required by 60 CES/CEVC.

3.9.6.2 Soil identified as contaminated during construction shall be stockpiled as described in paragraph 3.9.5 above and characterized in accordance with Title 22 of the California Code of Regulations. Laboratory analysis required may include CAM 17 Metals, EPA Method 8260 for volatile organics, EPA method 8270 for semi-volatile organics, TPH diesel, TPH Gasoline, TPH JP-8 and others.

3.9.6.3 Sample testing of soil at select locations was conducted as part of the design analysis. The test locations were based on anticipated excavation locations associated with installation of new electrical ductbanks. The soil sample test report is included as Attachment C.

3.9.7 Disposal

Disposal and transfer of both waste and hazardous waste soil shall be directly from the project site to an approved disposal facility. The Contractor shall prepare a soil profile as approved by the disposal facility and appropriate shipping documents. The profile, shipping papers, hazardous waste manifest (if applicable), lab analysis, and any other supporting documentation shall be provided for 60 CES/CEVC for approval prior to shipment.

3.9.8 Dumping

3.9.8.1 Dumping is not authorized on Travis AFB; all reports of illegal land disposal will be investigated by 60 CES/CEV and may be referred to appropriate regulatory authorities for enforcement.

3.9.8.2 Contractors responsible for illegal dumping shall be subject to all cleanup, mitigation, and restoration costs.

3.10 AIR QUALITY

3.10.1 Contractors shall obtain the necessary air permits for their own equipment (emission sources) and provide 60 CES/CEVC with a copy of the permits for regulatory inspections.

3.10.2 Contractors shall coordinate with 60 CES/CEVC prior to installing any new stationary source or modifying an existing permitted emission source, (i.e. aircraft engine test cells, boilers, power generators, incinerators, paint/fiberglass spray booths, bead blasting booths, underground/aboveground organic liquid storage tanks, oil water separators, open burning, aeration of contaminated soil, removal of underground/aboveground storage tanks) or use of any material regulated by the Bay Area Air Quality Management District.

3.10.3 Contractors are responsible for obtaining the necessary air permits from regulatory agencies for any new or modified source. The Contractor shall coordinate with 60 CES/CEVC prior to submitting air permit applications. Copies of original permits shall be sent directly to 60 CES/CEVC. 60 CES/CEVC will keep original copies and make necessary copies for contractors when permits arrive.

3.10.4 Contractors are responsible for ensuring environmental compliance with the federal, state, and local air district requirements.

3.11 PESTICIDES

Use of pesticides under the scope of this project is authorized provided the Contractor complies with requirements outlined within this paragraph.

3.11.1 References

a. Pest Management Plan *Travis AFB Integrated Pest Management Plan* (April 2001 or Current)

3.11.2 Submittals

a. Certificate - Applicator Certification

b. Report - Usage report

3.11.3 Approval

3.11.3.1 All pesticides, herbicides, insecticides, and rodenticides are hazardous materials. All pesticides to be used at Travis AFB must be on the AMC approved list of pesticides. Requests to use non-AMC listed pesticides shall be submitted in writing to 60 CES/CEOHB through the Contracting Office.

3.11.3.2 All requirements concerning Hazardous Material (HAZMAT) review and approval outlined in Paragraph 3.3 of this section apply to pesticides to be used on this project in addition to requirements of Paragraph 3.8. Additionally, a copy of pesticide labels to be used under the scope of this project shall be included with HAZMAT Submittals 3.3.2.1 and 3.3.2.2.

3.11.4 Applicator Certification

Application of all pesticides shall be accomplished by certified pest control personnel or under the supervision of a certified pest control operator. The Contractor shall submit personnel certification Submittal 3.8.2.1 with HAZMAT Submittals 3.3.2.1 and 3.3.2.2. Certifications shall be from the State of California and shall be valid through duration of work to be accomplished under this Contract.

3.11.5 Storage

All pesticides shall be stored, transported, and disposed of in accordance with all applicable federal, state, and local statutes, regulations, and

ordinances. Protective clothing and equipment shall be provided for and used by all persons engaged in the mixing and application of pesticides.

3.11.6 Usage Report

The Contractor shall submit a usage report Submittal 3.8.2.2 no later than seven (7) days after pest control applications are completed for the project. The usage report shall include, as a minimum:

a. Name, address, and phone number of Contractor

b. Name of the applicator

c. Building, facility, or area treated

d. Target pest(s) to be controlled

e. Pesticide Name and EPA Number

f. Active Ingredient Applied in pounds

g. Date of the application.

3.11.7 Disposal

The Contractor is prohibited from disposing of excess pesticides on Travis AFB in any manner. The Contractor is responsible for disposing of pesticides and pesticide waste in accordance with Paragraphs 3.8 of this section. Excess pesticides may be applied on Travis AFB if a written request to do so is approved by the Contracting Officer.

3.12 RADIOACTIVE MATERIAL (RAM)

3.12.1 List of Items Containing RAM

3.12.1.1 The Contractor shall submit for approval of the Contracting Officer a list of all permitted and non-permitted items containing RAM that shall be used in the performance of the Contract.

3.12.1.2 The following information shall be provided for each item on the list:

a. Item Nomenclature

b. Item Number

c. Radioactive Isotope

d. Activity in picocurries (pCi)

e. How the item is to be used

f. MSDS

3.12.1.3 If an item or items are permitted, the Contractor shall include a copy of the permit and certification of training required to manage the permit for each item.

3.12.2 Radiation Emitters

The Contractor shall submit for the approval of the Contracting Officer a list of all ionizing, non-ionizing and laser emitters that will be used in the

performance of the Contract. The following information shall be provided for each emitter:

3.12.3 Ionizing Emitters

a. Item Nomenclature

b. Quantity

c. Operating Power (kVp and mA)

d. Source Material

e. Manufacturer's Hazard Distances (estimated, calculated or measured)

3.12.4 Non-Ionizing Emitters

a. Item Nomenclature (including microwave ovens used in the industrial process, i.e. heating glue)

b. Quantity

c. Operating Power (range and normal)

d. Operating Frequency (range and normal)

e. Wave type (continuous or pulsed)

f. Manufacturer's Hazard Distances (estimated, calculated or measured)

3.12.5 Laser

a. Item Nomenclature

b. Quantity

c. Source Material*

d. Health Hazard Statement from the manufacturer on the hazards associated with the use of the laser*

e. MSDS* (*Class 2, Class 3 and Class 4 only)

All lasers shall meet the storage, use, labeling and handling requirements in 10 CFR.

3.13 FLUORESCENT LIGHT TUBES AND HIGH INTENSITY DISCHARGE (HID) LAMPS

3.13.1. All fluorescent tubes and HID lamps that are removed as part of this work shall be removed intact and recycled by the Contractor, to be handled as "universal waste containing mercury". The Contractor shall provide containers for the collection of these recyclable materials. The Contractor will carefully place all light tubes and/or lamps in these containers, keep the lid securely closed at all times, and protect the containers from precipitation. Containers shall be labeled in accordance with State universal waste requirements for storage and shipping.

3.13.2. Fluorescent light tubes and HID lamps that are broken are hazardous wastes. If breakage occurs, workers can be exposed to toxic mercury vapor.

3.13.3. It is imperative that the Contractor not discard fluorescent light tubes or HID lamps on base in dumpsters or other debris collection containers.

3.13.4. Contractor shall submit weight receipts and certificates of recycling for all shipments of fluorescent lights off base.

3.14 SPILLS

3.14.1 Contractors are responsible for spills occurring on their sites or caused by their operations. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the Contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Spills of HAZMAT or hazardous waste shall be managed in accordance with the current 60 AMW Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response for Travis AFB. Disposal of wastes generated from spill cleanup shall be the Contractor's responsibility and be in accordance with paragraph 3.2 and 3.8 of this section.

3.14.2 If a spill occurs on the installation which is beyond the Contractor's ability to clean up or that impacts soil, water, or drains; the Contractor shall immediately call 911 as described above. If a spill occurs off the installation, the Contractor shall report spills related to project activities to the Department of Transportation, the National Response Center (NRC), the Installation Environmental Coordinator, and the Contracting Officer immediately following discovery and shall also comply with applicable State and Federal requirements. A written follow-up report shall be submitted to the Contracting Officer, not later than 7 days after the initial report. The written report shall be in narrative form and as a minimum include the following:

a. Description of the material spilled (including identity, quantity, and manifest number).

b. Whether amount spilled is EPA/state reportable and when and to whom it was reported.

c. Exact time and location of spill, including description of the area involved.

d. Receiving stream or waters.

e. Cause of incident and equipment and personnel involved.

f. Injuries or property damage.

g. Duration of discharge.

h. Containment procedures initiated.

i. Summary of any communications Contractor has with press, agencies, or Government officials other than COR.

j. Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.

ATTACHMENT 1 - TEMPORARY STAGING OF CONTAMINATED SOIL

ATTACHMENT 2 - MAP OF NATURAL RESOURCE PRESERVE AREAS ON TRAVIS AFB

END-OF-SECTION

SECTION 01572

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
02/03

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.2 MANAGEMENT

The Contractor shall take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling shall accrue to the Contractor. Firms and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

1.3 PLAN

A waste management plan shall be submitted within 15 days after notice to proceed and prior to initiating any site preparation work. The plan shall include the following:

a. Name of individuals on the Contractor's staff responsible for waste prevention and management.

b. Actions that will be taken to reduce solid waste generation.

c. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.

d. Characterization, including estimated types and quantities, of the waste to be generated.

e. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

f. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.

g. List of specific waste materials that will be salvaged for resale, salvaged and reused, or recycled. Recycling facilities that will be used shall be identified.

h. Identification of materials that cannot be recycled/reused with an explanation or justification.

i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

1.4 DOCUMENTS

Integrated Solid Waste Management Plan (Most Current Version)

Travis Solid Waste Management Plan (Most Current Version)

1.5 RECORDS

Records shall be maintained 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. The records shall be made available to the Contracting Officer during construction, and a copy of the records shall be delivered to the Contracting Officer upon completion of the construction.

1.6 COLLECTION

The necessary containers, bins and storage areas to facilitate effective waste management shall be provided and shall be clearly and appropriately identified. Recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials and separated by one of the following methods:

1.6.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing.

1.6.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.6.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.7 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.7.1 Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

1.7.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

1.7.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

-- End of Section --

SECTION 01575T

TEMPORARY ENVIRONMENTAL CONTROLS
04/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The Contractor and all subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and protection, as well as the specific requirements included or referenced under these contract specifications. Applications for permits will be submitted through 60 CES/CEVC. Contractors shall not contact any regulatory agency without prior approval from 60 CES/CEV.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 112	Oil Pollution Prevention
40 CFR 172	experimental Use Permits
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

1.2 NOTIFICATION OF NON-COMPLIANCE

Upon receipt of written notification of noncompliance from the Contracting Officer, the Contractor shall immediately take corrective action as directed by the Contracting Officer. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. All costs associated with the correction and suspension of work shall be the sole responsibility of the contractor.

1.3 SUBCONTRACTORS

The requirements of these specifications shall be included in any subcontract written under this contract. Compliance with the provisions of the specifications by subcontractors shall be the responsibility of the Contractor.

1.4 ENVIRONMENTAL PERMITS AND CERTIFICATIONS

The Contractor is responsible for obtaining all applicable environmental permits and certifications necessary to accomplish all work. Requirements for specific permits and certifications are included in subsequent subsections. The Contractor shall coordinate with 60 CES/CEV prior to submitting permit applications. Under no circumstances shall the contractor contact an outside regulatory agency unless and until authorized to do so by 60 CES/CEV.

1.5 ENVIRONMENTAL FINES AND PENALTIES

The Contractor agrees to indemnify the Government, its officers, agents, and employees against liability and costs associated with the intentional or negligent noncompliance of environmental laws, regulations, or requirements by the Contractor, its officers, agents, employees, or subcontractors to the extent such noncompliance arises out of the manufacture or delivery of supplies, services or construction by or for the account of the Government.

1.6 DEFINITIONS

1.6.1 Hazardous Waste Accumulation

The temporary holding of hazardous waste during waste generation activities for a specific limit of time past the accumulation start date.

1.6.2 Air Pollution

The generation and/or release to the atmosphere of one or more air contaminants, as defined in 40 CFR, in the outdoor atmosphere in excess quantities of regulatory thresholds, or for a duration of time, that is determined by the Contracting Officer or his/her authorized representative, to be injurious to human health or which unreasonably interferes with enjoyment of life or use of property.

1.6.3 Bill of Lading

A shipping document containing information required by the United States Department of Transportation (DOT) for commodities and hazardous materials.

1.6.4 Conditionally Exempt Small Quantity Generator

There are no conditionally exempt small quantity generators on Travis AFB. All hazardous waste; to include contractor generated hazardous waste must be properly handled, stored and disposed in accordance with the Travis AFB Hazardous Waste Management Plan.

1.6.5 Container

Title 22, Section 66260.10 defines a container as "any device that is open or closed, and portable in which a material can be stored, handled, treated, transported, recycled or disposed of." Containers include portable tanks. Title 13, Section 1160.3(j) defines containers as any covered or uncovered receptacle to be used for

transporting hazardous waste and having a capacity greater than 110 U.S. gallons.

1.6.6 Hazardous Waste

Wastes are considered hazardous if containing one of the following characteristics: ignitable, corrosive, reactive, or toxic. Note that California's criteria for corrosive and toxic wastes are more inclusive than USEPA.

1.6.7 Disposal

Disposal is defined as the discharge, deposit, injection, dumping, spilling, leaking, or placing of any waste into or on any land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into the waters, including ground water.

1.6.8 Disposal Facility

A facility or part of a facility at which waste is intentionally placed into or on any land or water, and at which waste will remain.

1.6.9 Disposal Site

The location where any final deposition of waste occurs.

1.6.10 Dust

Minute solid particles caused to be suspended by natural forces or by mechanical processes such as, but not limited to, the following operations: crushing, grinding, milling, drilling, demolishing, shoveling, conveying, covering, bagging, mixing, and general vehicle operations, and sweeping.

1.6.11 Environmental Pollution

The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic or recreational purposes.

1.6.12 Excluded Hazardous Waste

Any hazardous waste or mixture of hazardous wastes in which a significant percentage of the waste is recycled and reused at the same location the waste is originally generated. Excluded Recyclable Materials must be labeled and properly managed while being accumulated on site.

1.6.13 Extremely Hazardous Waste

The list of extremely hazardous wastes is provided in Title 22, CCR Section 66261.110.

1.6.14 Generator or Producer

Any person, by site, whose act or process produces hazardous waste, identified or listed in 40 CFR 261 or Chapter 11 of Title 22 CCR or whose act first causes a hazardous waste to become subject to regulation. Travis AFB is the generator for hazardous wastes generated on Base.

1.6.15 Hazardous Constituent

Hazardous constituent (a) constituent identified in Appendix VIII to Chapter 11 of CCR Section C; (b) any other element, chemical compound, or mixture of compounds which is a component of a hazardous waste or leachate and which has a physical or chemical property that causes the waste or leachate to be identified as a hazardous waste.

1.6.16 Hazardous Material (Hazmat)

Any substance defined by OSHA as a hazardous substance requiring a Material Safety Data Sheet, including, but not limited to, any chemicals, paints, adhesives, sealing compounds, strippers, glues, petroleum products, natural or synthetic gases, pesticides and all compounds containing hazardous substances.

1.6.17 Hazardous Materials Pharmacy (HAZMART)

The HAZMART provides the central tracking function for all hazardous materials used on Travis AFB.

1.6.18 Hazardous Waste (HW)

A waste is hazardous if it is listed as a hazardous waste or exhibits one or more of the following characteristics as defined in 40 CFR 261 and Section 66261.3 of Title 22 CCR: ignitability, corrosivity, reactivity, and/or toxicity.

1.6.19 Incompatible Waste

A hazardous waste which is unsuitable for (a) placement in a particular device or facility because it may cause corrosion or decay of containment materials (e.g. container inner liners or tank walls); (b)commingling with another waste or material under uncontrolled conditions because the commingling might produce heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes, or eases.

1.6.20 Hazardous Waste Manifest

The shipping document DTSC 8022A required by 22 CCR 66262 for shipments of hazardous waste. Generator certifications on all hazardous waste manifests must be signed by 60 CES/CEV or a designated representative. No shipment of hazardous waste can leave Travis AFB until the generator certification is signed.

1.6.21 Natural Resources

All plants, animals, and ecosystems existing within the boundaries of Travis Air Force Base.

1.6.22 Open Burning

Any outdoor fire from which the products of combustion are emitted directly into the open air without passing through a stack, chimney, or duct.

1.6.23 Particulate Matter

Any material, liquid or solid, other than water, which is suspended in air or other gases.

1.6.24 Post-Consumer Material

Any material or finished product that has served its intended use and has been discarded for disposal or recovery having completed its life as a consumer item.

1.6.25 RCRA

Resource Conservation and Recovery Act (RCRA) is the federal statute used to regulate facilities that generate, treat, store, or dispose of hazardous waste.

1.6.26 Recovered Material

Waste materials and by-products that have been recovered or diverted from solid waste, but not including those materials and by-products generated from, and commonly reused within, an original manufacturing process.

1.6.27 Recyclability

Ability of a product or material to be recovered from, or otherwise diverted from, the solid waste stream for the purpose of recycling.

1.6.28 Recyclable Material

A solid waste that is capable of being recycled, including, but not limited to, any of the following: (a) a residue; (b) a spent material, including but not limited to a used or spent stripping or plating solution or etchant; (c) material that is contaminated to such an extent that it can no longer be used for the purpose for which it was originally purchased or manufactured; (d) a byproduct listed in Section 66261.31 or Section 66261.32 Title 22 CCR; (c) any retrograde material that has not been used, distributed, nor reclaimed through treatment by the original manufacturer or owner by the later of the following dates: (1) one year after the date the material became a retrograde material; (2) if the material has been returned to the original manufacturer, one year after the material is returned to the original manufacturer.

Any material designated by 60 CES/CEV as of the date of this contract as having recyclable value and can be collected to reclaim that value. Typical recyclable materials include, but are not limited to: aluminum

cans, asphalt, books, ceiling tiles, construction debris, corrugated cardboard, copper tubing, magazines, newspapers, office paper, used oil, metal cans, plastic bottles, glass bottles, scrap metals, tires, wire/metal cable and wood pallets.

1.6.29 Recycling

The series of activities, including collection, separation and processing, by which products or other materials are recovered from the solid waste stream for use in the form of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion.

1.6.30 Residue

The hazardous materials remaining in a packaging, including a tank ear, after its contents have been unloaded to the maximum extent practicable and before the packaging is either refilled or cleaned of hazardous materials and purged to remove any hazardous vapors.

1.6.31 Satellite Accumulation of Hazardous Waste

A generator may accumulate up to 55 gallons of hazardous waste (or one quart of acutely or extremely hazardous waste) without a permit at the initial point of accumulation for up to one year, provided the specific requirements of 22 CCR 66262 are met.

1.6.32 Solid Waste

Solid Waste is any discarded material. Solid Waste is any material, liquid, gaseous or solid, that is deemed as waste because it is no longer needed, is excess, has exceeded its shelf life, is spill residue, has been abandoned or is no longer usable for its intended purpose.

Solid waste also includes, but is not limited to: chemicals, contaminated clothing, empty containers, garbage, packaging, construction and demolition debris, refuse and all other discarded materials that are generated during construction, industrial, residential, and commercial activities.

1.6.33 Spill

Any unauthorized or unpermitted release of a hazardous material outside of the primary container. The spill could be due to human error, faulty equipment, failed containers, or natural mishap.

1.6.34 Tank

A stationary device designed to contain an accumulation of hazardous waste which is constructed primarily of nonearthen materials (e.g., wood, concrete, steel, plastic) which provide structural support. A "portable tank" (without structural support, etc.) is defined as a container.

1.6.35 Hazardous Waste Treatment

Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character, composition of any hazardous waste so as to neutralize such waste or as to render such waste non-hazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume. This includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it non-hazardous.

1.6.36 Universal Waste

Universal wastes are hazardous wastes such as many types of batteries (other than lead-acid), mercury switches and thermostats, lamps, non-empty aerosol cans, cathode ray tubes, and electronic devices that are managed under less stringent standards than other hazardous wastes. Universal wastes and management standards are defined in 22 CCR 66273.

1.6.37 Vernal pool

A vernal pool is type of seasonal wetland that occurs in California's grasslands where soils are poorly drained. These pools are full of water in the winter rainy season and dry up in the spring and remain dry throughout the summer and most of the fall. Vernal pools on Travis AFB are protected federal wetlands and must not be disturbed. Additionally, vernal pools harbor many rare species of plants and animals, some of which are protected under the Endangered Species Act.

1.6.38 Waste Prevention

Any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they are discarded. Waste prevention also refers to the reuse of products or materials.

1.6.39 Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, vernal pools and similar areas.

1.7 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08, Statements

MSDS for Class I ODS wavered product; G

SD-18, Records

Submit copies of all permits including excavation permits, hot work permits and all permits issued by on Base and outside regulatory agencies

Disposal permit for hazardous waste; G

Submit a copy of the applicable EPA and State permits, manifests, or licenses for transportation, treatment, storage, and disposal of hazardous waste by permitted facility.

Environmental training documentation; G

Permit to transport hazardous waste; G

Submit one copy of the EPA or State permit license, or regulation for the transporter who will ship the hazardous waste to the permitted Treatment, Storage, and Disposal (TSD) facility.

Hazardous waste certification; G

Submit written certification that hazardous waste turned in for disposal was generated on Government property and is identified, packaged, and labeled in accordance with 40 CFR 261, 40 CFR 262, and 40 CFR 263.

Environmental Plan Review; G

Landfill, Recycling Facility & Transporter Information; G

Weight Receipts for Solid Waste Disposed and Materials Recycled; G

Site Specific Storm Water Pollution Prevention Plan; G

Notice of Intent; G

Initial Fee; G

Annual Compliance Status Report; G

Notice of Termination; G

Contractor Information Sheet(s); G

Material Safety Data Sheets (MSDSs); G

Substantiating Documentation for Use of Specific HAZMAT; G

HAZMAT Usage Log; G

Contractor's Field Location Sketch; G

Certification of Compliance; G

Request for Hazardous Waste Treatment

Notification of Temporary Satellite Accumulation Point; G

Certification of training; G

Hazardous Waste Manifests, Non-Hazardous Waste Data Forms, Land Disposal Restrictions, Waste Profiles, Laboratory Analyses, and Material Safety Data Sheets; G

1.8 LABORATORY ANALYSIS

Contractors are responsible for the analysis, characterization, and identification of all wastes generated by their operation. Characterization and profiling shall be in accordance with Title 22 of the California Code of Regulations and the Travis AFB Hazardous Waste Management Plan and be subject to 60 CES/CEVC review.

1.9 ENVIRONMENTAL PROTECTION REGULATORY REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined in this section. Plan for and provide environmental protective measures to control pollution that develops during normal construction practices. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including but not limited to, the following rules and regulations of the Bay Area Air Quality Management District:

a. Regulation 6 for any particulate matter and visible emissions.

b. Regulation 8-1 for general provisions for emissions during operations.

c. Regulation 8-3 for architectural coatings.

d. Regulation 8-51 for adhesive and sealant products.

e. Regulation 11-1 for lead.

f. Regulation 11-2 for asbestos containing material, demolition and renovations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 GENERAL ENVIRONMENTAL REQUIREMENTS

3.1.1 Open Burning

The Contractor is prohibited from open burning on Travis AFB.

3.1.2 Historical and Archeological Findings

If the Contractor has a reasonable suspicion he or she has discovered any item (bones, artifacts, structures, etc.) or area of historical or archaeological interest not specified in the contract during the completing of work, the Contractor shall leave the area undisturbed, render it safe for and from workers and the public, and immediately report the finding to the Contracting Officer.

3.1.3 Unidentified Materials

3.1.3.1 Asbestos Containing Material (ACM)

If the Contractor believes they have discovered any ACM not specified in the contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer.

3.1.3.2 Lead-Based Paint (LBP)

If the Contractor believes they have discovered any LBP not specified in the contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer.

3.1.3.3 Polychlorinated Biphenyls (PCBs)

If the Contractor believes they have discovered a PCB containing item not
specified in the contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer. The Contractor shall not use or install any equipment containing PCBs on Travis AFB.

a. Contractors are responsible for properly managing PCBs and waste generated from PCB contaminated materials including light ballast's. Proper management includes but is not limited to handling, marking, labeling, packaging, transporting, and disposing of PCBs. When managing PCBs, the contractor must follow federal, state, and local standards. The Code of Federal Regulations (40 CFR 761) outlines procedures for handling PCBs above 50 parts per million (ppm). California also regulates PCBs as hazardous waste above five ppm.

b. Because the danger PCBs pose to human health, contractors shall ensure measures are in-place to prevent injury to personnel, accidental releases, and environmental contamination. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Waste PCB material cannot remain on-site for more than 90 days. While in storage, contractors shall comply with all applicable requirements that govern PCB hazardous waste management. A representative from 60 CES/CEV must sign all manifests for PCBs destined for disposal. The contractor must provide laboratory analysis for all manifested PCBs.

3.1.3.4 Transformers

The Contractor shall not use or install any equipment containing PCBs on Travis AFB.

3.1.3.5 Building Demolition and Renovation

Contractors must comply with Travis AFB Instruction 32-109 paragraphs 3.6 through 3.17.1 before demolition starts and paragraph 4.10.1 and all of section 5 when demolition is complete.

a. Buildings shall not be demolished without prior coordination with 60 CES/CEVP.

b. Buildings shall not be demolished or renovated without prior surveys for asbestos materials, lead base paint, PCB and other hazardous materials.

c. Contractors shall obtain the Contracting Officer's written approval to proceed in advance of any demolition or renovation.

d. There shall be no visible emissions from the work site during demolition or renovation

3.2 SOLID WASTE MANAGEMENT

The Contractor is authorized to generate or dispose of solid waste under the scope of this contract in accordance with this section.

3.2.1 References

a. Integrated Solid Waste Travis AFB Solid Waste Management Plan (Most Management Plan Current Version)

b. Executive Order 13101 Greening of the Government Through Waste Prevention, Recycling and Federal Acquisition (16 Sep 98)

c. CCR Title 14, Division 7, California Integrated Waste Management Board Chapter 3.0, Article 5.9

3.2.2 Management of Solid Waste

a. The Contractor shall be responsible for collecting all solid wastes generated under the scope of this contract. All Construction and Demolition debris (C&D) shall be recycled either onsite or at a C&D recycling facility. The Contractor shall segregate recyclable wastes (i.e. copper piping, asphalt, , concrete, lumber, plastics, ceiling tiles, all scrap metal, etc.) and universal wastes (fluorescent lamps, ballasts, batteries, etc). Non-recyclable solid waste generated under the scope of this contract shall be taken to an approved landfill.

b. The Contractor shall determine the location of the recycling or disposal facilities to be used for all materials recycled and/or disposed of which will be generated from the work performed under this contract, as well as their method of transport. Within ten (10)calendar days after the Notice to Proceed (NTP), the Contractor shall submit the Landfill, Recycling Facility & Transporter Information including name, address, and phone number for each of the chosen facilities and transporters to the Contracting Officer for approval.

c. The Contractor shall collect all solid wastes generated during the performance of the contract in a container/area provided by the contractor and approved by the Contracting Officer. The Contractor shall provide appropriate containers for the collection and segregation of solid wastes, recyclables, and C&D debris generated directly and indirectly by work under this Contract. The Contractor is prohibited from using base dumpsters or other waste receptacles for the disposal of any solid wastes. All solid wastes shall be reclaimed, recycled, or disposed of prior to completion of work on Travis AFB.

d. As proof of proper disposition of solid wastes, the Contractor shall provide legible Weight Receipts for Solid Waste Disposed and Materials Recycled bearing the name, address, and phone number of the receiving facilities for every load of materials delivered. The weight ticket shall detail the type of material, weight of the material in pounds, the date of the transaction, and a signature from a representative of the receiving facility. Receipts shall be submitted to the Contracting Officer within ten (10) calendar days after the transaction.

3.3 HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT

The Contractor is authorized to use hazardous materials under the scope of this contract in accordance with this section.

3.3.1 References

a. AFI 32-7086 Air Force Instruction, AMC Supplement 1 Hazardous Material Management (December 1998)

b. Spill Contingency Plan Travis AFB Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response (Most current version)

3.3.2 Base HAZMART

The Contractor shall participate in the Base HAZMART program to the extentdescribed in this contract as required by AFI 32-7086, AMC Supplement 1. Participation shall include:

a. Designation of a single individual who has experience and knowledge of HAZMAT issues;

b. Provision of MSDSs for all HAZMAT to be used or stored on base;

c. Limited storage of HAZMAT on base;

d. Coordination of all HAZMAT used or stored on base from the Base HAZMART; to include HAZMAT bar-coding and tracking

e. Tracking daily usage of all HAZMAT used or stored on base;

f. Implementation of Best Management Practices (BMPs) to prevent spills and other releases to the environment to meet NFPA, OSHA, and RCRA requirements;

g. Participation in an accurate exit inventory of materials used on base at the end of the contract.

3.3.3 Coordination Process for HAZMAT usage on Base

a. Within ten (10) days of the NTP, the Contractor shall submit to the Contracting Officer a completed copy of the Contractor Information Sheet listing all HAZMAT to be used and approximate quantities to be used prior to beginning work. The Contracting Officer will provide a blank Contractor Information Sheet to the contractor at the preconstruction meeting. Within ten (10) days of the NTP, the Contractor shall also submit to the Contracting Officer one (1) legible copy of the most current MSDSs for each HAZMAT item to be used during the performance of work under this contract. As soon as the coordination is completed, the Contractor may bring bar-coded HAZMAT onto Travis AFB. The Contractor is prohibited from bringing HAZMAT onto Travis AFB prior to receiving bar-codes from the Base HAZMART.

b. Substantiating Documentation for the use of any HAZMAT required to complete work shall be submitted with the MSDS if the HAZMAT contains any of the following: Phosphates or Phosphate Compounds of any kind; EPA 17 Toxic Chemicals; Ozone Depleting Chemicals (ODCs); High Volatile Organic Compounds (VOCs);CERCLA 102(a) Extremely Hazardous Substances (EHSs); or Hazardous Air Pollutants (HAPs).

c. Substantiating documentation shall include a review of available, less hazardous HAZMAT options and all qualifying reasons why they cannot be used.

d. Without substantiating documentation and review of less hazardous options, approval for use of the HAZMAT may not be granted.

e. The Contractor shall maintain a current MSDS on base for each HAZMAT item at the site where the HAZMAT is being stored or used, and shall make the MSDSs available for inspection upon request from the Contracting Officer.

3.3.4 Bar-Coding/Tracking HAZMAT

a. The Contractor shall contact the Base HAZMART (707-424-2689) between 0800 hours and 1400 hours within 1 hour of bringing approved HAZMAT onto the base for use to arrange for bar-coding of all HAZMAT.

b. The Base HAZMART manager will compare the HAZMATs to those listed on the Contractor Information Sheet(s) and Material Safety Data Sheets (MSDSs) to ensure they are exactly the same. If they do not match, the HAZMAT cannot be bar-coded until authorized per paragraph COORDINATION PROCESS FOR HAZMAT USAGE ON BASE. The Base HAZMART manager will then issue barcodes to be placed on each HAZMAT container. The contractor shall ensure that all hazmat containers are bar-coded prior to transporting hazmat on base. Barcodes shall not be destroyed, mutilated, covered, or otherwise made illegible to a barcode reader by the Contractor prior to the exit inventory for the HAZMAT. If additional HAZMAT is brought onto the base after initial registration, the Contractor shall contact the Base HAZMART and request bar-coding immediately.

c. Unregistered HAZMAT (containers without a HAZMAT barcode) will be reported to the Contracting Officer upon discovery, the Contractor may be directed to stop work and remove any unregistered hazardous materials from the base.

3.3.5 Tracking Usage of HAZMAT

a. Contractor shall maintain a daily Usage Log for each HAZMAT item authorized and used on the project.

b. The Usage Log shall indicate the stock number, name of the material, the date used and the quantity used in units of measurement consistent with the volume units identified on the container (i.e. if the container is marked in ounces, the Usage Log shall indicate usage in ounces). The log shall also include dates of spillage or waste (when applicable).

c. Empty HAZMAT containers shall be marked on the Log as "Empty" on the date it was used. When empty containers have been generated, the contractor shall notify the Base HAZMART via telephone (707-424-2689) and shall provide the barcode number of the used materials. The contractor is responsible for ensuring all empty containers are removed from the base and disposed of (or recycled) in accordance with section 3.2 Solid Waste Management and paragraph HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT.

d. The HAZMAT Usage Log shall be made immediately available for review upon verbal request from the Contracting Officer. All usage logs shall be submitted to the Contracting Officer weekly (no later than Monday of the following week). Usage logs should only record one week's usage at a time.

e. The Contractor shall contact the Base HAZMART Manager to arrange an exit inventory to be completed by the Base HAZMART Manager as soon as HAZMAT items are no longer needed on site

and prior to disposal or transport off base. HAZMAT shall not be disposed of, or transported off base, prior to the exit inventory.

3.3.6 HAZMAT Storage

a. The Contractor shall store all HAZMAT in a designated HAZMAT storage area. The Contractor shall anticipate receiving at least one assessment during the contract period to ensure their HAZMAT storage area is in compliance with HAZMAT storage requirements outlined in this section.

b. The Contractor shall ensure that all Best Management Practices in paragraph BEST MANAGEMENT PRACTICES (BMPS) of this section are in place while HAZMATs are being used or stored on base.

c. The Contractor shall provide secondary containment for all HAZMAT being stored and used on base. Secondary containment shall be chemically inert to the HAZMAT being stored and impervious to absorption of the HAZMAT. The containment volume shall not be less than 110% of the total quantity stored in the single largest container. Separate secondary containment shall be provided for incompatible HAZMAT.

d. The location on Government Property of the Contractor's field office, storage and other facilities required for the performance of the work shall be upon cleared areas of the job site, areas to be cleared, or other areas designated by the Contracting Officer. The Contractor shall submit a sketch showing the location of the areas designated for temporary field offices, equipment storage, material storage and staging. The sketch shall be submitted for government review prior to commencement of work. The preservation of the landscape shall be an imperative consideration in the selection of all sites. No activity shall be conducted or storage permitted within the dripline of any tree without being depicted on the drawings and being approved by the Contracting Officer.

3.3.7 Best Management Practices (BMPs)

a. NFPA and OSHA required or specified flammable material and corrosive material storage lockers shall be used for the storage of all HAZMAT.

b. The Contractor shall ensure that the segregation of incompatible materials is accomplished at all times in his or her field office, storage, staging, and work areas.

c. Ensure the use of protective measures such as drop cloths and tarpaulins when using HAZMAT to keep the work and storage areas free from drips and spills.

d. Keep all containers closed when not in use. At the end of the workday, or when finished using any material, return the container to a proper storage area.

e. Do NOT store HAZMAT outdoors where it can be exposed to precipitation.

f. Follow all manufacturer's recommendations for storage and use of HAZMAT.

g. Ensure that all employees are given proper training in the use of the HAZMAT onsite and all personal protective equipment necessary for the use of HAZMAT on Travis AFB.

h. MSDSs for each HAZMAT item being used are required by OSHA to be available onsite to employees. The Contractor shall have current copies available at all times where employees can access them in case of emergency.

3.3.8 Spill Control and Clean Up

The Contractor shall be responsible for the cleanup and disposal of all spilled materials whether or not they are HAZMAT. This includes all materials use to contain and absorb the spill. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Spills of HAZMAT or hazardous waste shall be managed in accordance with the current 60 AMW Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response for Travis AFB. Disposal of wastes generated from spill cleanup shall be the contractor's responsibility and be in accordance with paragraph SOLID WASTE MANAGEMENT and HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT of this section.

3.4 STORM WATER POLLUTION PREVENTION

The Contractor may be required to perform land disturbing activities and facility work under the scope of this project. The Contractor shall comply with a government approved, site specific Storm Water Pollution Prevention Plan including all erosion control practices, best management practices, housekeeping, and storage requirements included within.

3.4.1 References

a. State Water Resources Control Board Water Quality Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) Permit For Discharges Of Storm Water Runoff Associated With Construction Activities.

b. State Water Resources Control Board Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System (NPDES) Permit For Discharges Associated With Industrial Activities.

c. Fairfield-Suisun Sewer District Permit #433-02

d. Fairfield-Suisun Sewer District Local Ordinance #91-1

e. San Francisco Bay Basin Plan Objectives

3.4.2 Permits

The Contractor is responsible for providing all submittals in this paragraph to the Contracting Officer and ensuring compliance with the general construction NPDES permit.

3.4.3 Construction Sites 1 Acre or More

For construction sites which result in soil disturbance of 1 acre or more, or which are part of a larger common plan which totals 1 acre or more, including excavation, lay down area, parking, access roads, soil piles, etc., the Contactor must provide submittals at least 30 days before construction begins to the Contracting Officer for coordination and submittal to State Water Resources Control Board to obtain a site specific NPDES construction permit. NPDES permits must be obtained prior to start of related construction activities.

3.4.3.1 Storm Water Pollution Prevention Plan

The Storm Water Pollution Prevention Plan shall be developed in accordance with guidelines contained in Reference (a), Section A. A copy of this information, titled "STORMWATER POLLUTION PREVENTION PLAN FOR CONSTRUCTION SITES 1 ACRE OR MORE" is available from the Contracting Officer.

3.4.3.2 Notice of Intent

The Contractor shall provide Notice of Intent in accordance with Reference (a) Section A. A copy of this information, titled "NOTICE OF INTENT (NOI) TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY, GENERAL INSTRUCTIONS" is available from the Contracting Officer.

3.4.3.3 Fee

An initial fee based on the area of ground disturbance must be submitted to the Contracting Officer, along with the Notice of Intent for construction projects which last more than one year. The amount of this fee may be calculated using the State Water Resources Control Board's fee table for construction activities contained in Reference (a).

3.4.3.4 Annual Compliance Status Report

Before June of every year, the Contractor shall evaluate the construction site and submit documentation describing the current project status including but not limited to grading, site disturbance, erosion and sediment control practices already in effect. Best Management Practices that will be implemented prior to the next wet season including time schedule, and upcoming events such as project completion, land disturbances, etc shall also be submitted.

3.4.3.5 Notice of Termination

Upon completion of the project, The Contractor shall provide all necessary documentation outlined in the Contractor's NPDES permit, including a Notice of Termination (NOT) to the Contracting Officer in order to close out the construction NPDES permit.

3.4.4 Construction Sites Less than 1 Acre

For construction sites that result in soil disturbance of less than 1 acre, no site specific NPDES permit is required and no Notice of Intent, Fee or Notice of Termination need be submitted. However, a site specific Storm Water Pollution Prevention Plan must be submitted to the Contracting Officer at least 30 days before construction begins. The contractor is prohibited from beginning land-disturbing activities until the Contracting Officer has approved the SWPPP.

3.4.4.1 Storm Water Pollution Plan

The Storm Water Pollution Prevention Plan shall be developed in accordance with guidelines titled "TRAVIS AFB STORMWATER POLLUTION PREVENTION PLAN GUIDELINES FOR CONSTRUCTION SITES LESS THAN 1 ACRE", available from the Contracting Officer.

3.4.5 Water

This paragraph applies to all water impacted by or generated by the construction activity. Discharge of hazardous waste water is not permitted under any circumstances.

3.4.5.1 Storm Water

a. For the purpose of this contract, storm water is defined as rainwater that comes in contact with the construction site, other sites on Travis AFB associated with the construction project and all construction project materials and equipment.

b All storm water discharged to the storm sewer system must meet effluent requirements described in References (a) and (b).

c. During the construction phase, the Contractor is responsible for preventing pollutants, i.e. soil erosion, construction material, petroleum products, chemicals etc., from entering the storm drainage system.

d. The Contractor shall use "Best Management Practices" in controlling construction site run-off and erosion, including but not limited to proper stockpiling of excavated soils, use of sediment traps, proper storage of material, inspection, monitoring, equipment drip pans, storage and fueling area secondary containment, etc.

3.4.5.2 Contained Storm Water

a. Contained storm water is defined as water that collects in secondary containment berms, impoundments, trenches, excavations, foundation footings, etc., as a result of direct rain or surface water run-on.

b. Contained storm water is authorized for discharge to the storm sewer system provided it meets above requirements.

c. Whenever practicable, the Contractor shall discharge contained storm water to a pre-approved permeable area. The Contractor shall discharge at a rate which does not cause erosion or sediment-laden runoff or cause flow onto non-Air Force or non-federally owned properties. Appropriate BMPs shall be used to prevent discharge of sediment-laden storm water to the storm sewer system.

d. The Contractor shall only discharge contained storm water during daylight hours. Prior to discharge, the Contractor shall inspect the water for sheen, odor or discoloration, which might indicate the presence of contaminants.

e. Contained storm water that contains a sheen, odor or discoloration indicating the presence of contaminants must be containerized and properly disposed of as wastewater in accordance with paragraph designated WASTEWATER.

f. The Contractor shall keep a log recording the day of each discharge, the source of water, the approximate quantity and person performing the discharge.

3.4.5.3 Non-Storm Water

For the purpose of this contract, non-storm water shall be defined as spring or ground water; potable water used for hydrostatic testing, fire hydrant flushing, street cleaning, operation, maintenance or testing of potable water systems, pipe flushing and drinking fountain water; atmospheric condensates including refrigeration, air conditioning and compressor condensate; irrigation drainage; and landscape watering.

a. Non-storm water discharges are authorized under Reference (a) provided they:

(1) Are approved by the Contracting Officer prior to discharge

(2) Comply with Section A.9 of Reference (a)

b. Do not cause or contribute to a violation of any water quality
standards

c. Do not violate any other provision of the general permit

d. Do not violate any provision of Reference (e)

e. Non-storm water discharges are prohibited if water comes from an area of known soil or ground water contamination, or contains a sheen, odor or discoloration indicating the presence of contaminants, the ground water must be containerized and disposed of as in paragraph WASTEWATER.

f. Non-storm water discharges shall be eliminated or minimized to the extent possible and shall be discharged to a permeable surface whenever practicable and in a manner which does not cause erosion or sediment laden runoff. Appropriate BMPs shall be used as required. All non-storm water discharges shall be approved prior to discharge by the contracting officer. Some discharges may require a separate permit or authorization from the Regional Water Quality Control Board with specified controls to be in place prior to or during discharge. All coordination with the Regional Water Quality Control Board shall be through the Contracting Officer.

g. The Contractor shall only discharge ground water during daylight hours. Prior to discharge, the Contractor shall inspect the water for sheen, odor or discoloration, which might indicate the presence of contaminants.

h. The Contractor may discharge water from potable water source used to rinse cement or mortar from mixing equipment or tools to a pervious area provided:

(1) The dried residual is removed and disposed of properly.

(2) Rinse water and surface runoff exposed to the area do not discharge directly into the storm sewer system.

3.4.5.4 Wastewater

Wastewater is defined as contaminated storm water or any water not meeting the definition of storm water, non-storm water, ground water, or unused potable water, and is prohibited from discharge to any location on Travis AFB without prior approval from the Contracting Officer.

3.4.5.5 Discharges to Sanitary Sewer

a. The Contractor shall obtain written approval from the Contracting Officer prior to discharging to the Travis AFB sanitary sewer system.

b. Discharge to the Travis AFB sanitary sewer system shall, at a minimum, meet the requirements of References (c) and (d).

c. The Contractor shall provide the Contracting Officer the following information in writing:

(1) Description of source and location of ground water

(2) Quantity

(3) Potential contaminants

(4) Proposed discharge location(s)

(5) Proposed discharge date(s)

d. 60 CES/CEVC will evaluate and coordinate the discharge with the Fairfield-Suisun Sewer District and notify the Contractor of any sampling requirements. Sample analyses must be performed by a state certified laboratory using EPA approved test methods for wastewater. Discharge is prohibited until sample results are approved by 60 CES/CEVC and the Fairfield-Suisun Sewer District. A fee and permit may be required by the Fairfield-Suisun Sewer District.

3.4.5.6 Disposal Off Base

Wastewater not meeting the criteria in paragraph WASTEWATER must be disposed off base in accordance with paragraph HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT.

3.4.6 Correspondence

The Contractor shall coordinate with the Contracting Officer prior to any correspondence with regulatory agencies.

3.4.7 Sampling and Analyses

All sampling and analyses shall be conducted by the Contractor at the Contractor's expense. All analyses shall performed by State certified laboratory in accordance with techniques described in 40 Code of Federal Regulations Part 136 and its amendments using analytical methods approved by the EPA in 40 Code of Federal Regulations Part 403.12(g)(4). All lab testing results shall be mailed directly to the Contracting Officer from the lab performing the testing.

3.4.8 Wetlands

If the Contractor believes he/she has encountered federally protected wetlands or vernal pools not specified in the contract during the execution of work, the Contractor shall stop work on the site immediately and notify the Contracting Officer.

3.5 PETROLEUM OIL AND LUBRICANT (POL) USE AND MANAGEMENT

a. Contractors are responsible for ensuring compliance with 40 CFR 112as well as the California Health and Safety Code Chapter 6.67, Section 25270.3 for any aboveground storage tank brought to the base for contractor's uses. There are no size exemptions on Travis AFB. Requirements include conducting daily visual inspections, proper labeling, secondary containment, proper grounding, etc. Vehicle/equipment filling and storage tank refilling must be monitored continuously and conducted in a manner to prevent spills and overfills.

b. Fuel storage tanks for refueling of contractor equipment must be approved by 60 CES/CEVC prior to installation.

c. Contractors are responsible for spills occurring on their sites or caused by their operations. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact

water, soil or any drain (sanitary or storm) the contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Spills of HAZMAT or hazardous waste shall be managed in accordance with the current 60 AMW Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response for Travis AFB. Disposal of wastes generated from spill cleanup shall be the contractor's responsibility and be in accordance with this specification.

3.6 NATURAL AND CULTURAL RESOURCES

The Contractor is required to avoid negatively impacting all natural and cultural resources on Travis AFB in accordance with this paragraph. Land resources shall be preserved in their present condition or, if approved by the Contracting Officer, restored to original condition which existed prior to the commencement of work. The Contractor shall confine work activities to areas defined by the specifications and/or drawings and to areas authorized by the Contracting Officer for other operations needed for the Contractor's performance.

3.6.1 References

a. Travis AFB INRMP
Travis AFB Integrated Natural Resources Management Plan (INRMP) (Most Current Version)

b. Travis AFB CRMP
Travis AFB Cultural Resources Management Plan (CRMP) (Most Current Version)

3.6.2 Protection of Landscape Features

a. Vernal pools occur throughout the grasslands and roadsides on Travis AFB and are federally protected wetlands. These seasonal wetlands also contain numerous rare and endangered plant and animal species. For most of the year, these pools are dry and are easily mistaken for unimproved grassland. The grassland areas on base also harbor protected species like the Burrowing owl and the California tiger salamander. These species use burrows in the grassland habitat as nest sites and forage and travel in the grassland areas. Because of the sensitivity of this habitat, the Contractor shall not travel off improved roadways in vehicles, store material or vehicles, dump water or sludge, or in any way disturb these grassland areas. Additionally, there are several areas on Travis AFB that are set aside as Preserves for vernal pools and the endangered species that inhabit them. No work is permitted in these areas (Attachment 2).

b. All drainages and creeks on Travis AFB are considered jurisdictional wetlands by the USACE. Contractors shall not enter these areas with vehicles or construction equipment nor place fill material intothese wetlands under any circumstances without the proper permits (Section 401 and 404 of the Clean Water Act). Examples of fill material include but are not limited to dirt, culverts, trash, rip rap, concrete, and

asphalt. Additionally, some roadside ditches may be classified as vernal pools and may harbor endangered plant or animal species and therefore must not be disturbed. When the contract allows work in proximity to wetlands and/or vernal pools, proper erosion control devices must be installed to protect the wetlands from run off and sedimentation. All erosion control devices must be removed by the Contractor once sufficient natural vegetation is in place to control erosion.

c. Except in areas marked on the drawings to be cleared, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without approval from the Contracting Officer. Trees designated as "to be saved" shall be protected from excavation or filling, storage and parking within the root zone closer than the normal drip line of the tree. No ropes, cables, or guys shall be fastened to or attached to any existing trees for anchorage unless specifically authorized by the Contracting Officer. Where such special emergency use is permitted, the Contractor shall first adequately wrap the trunk with a sufficient thickness of burlap, rags, etc., over which softwood cleats shall be tied before any rope, cable, or wire is attached. The Contractor shall be responsible for repair or replacement due to any damage resulting from such use.

d. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or activities, to include the root structure within the dripline of the tree, the Contractor shall protect such trees by constructing barriers or placing boards, planks, or poles around them. Monuments, markers, and works of art shall similarly be protected before proceeding with activities near them.

3.6.3 Restoration of Damage to Landscape Features

a. Any trees, vegetation, or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored to its original condition at the Contractor's expense. The Contracting Officer shall approve the manner of restoration to be used, and whether damaged trees shall be treated and healed, replaced or removed and disposed of under requirements for clearing and grubbing. The Contracting Officer will specify whether disturbed grassland sites will be revegetated and what seed mix and mulch application will be used.

b. All scars made on trees not designated to be removed, whether by equipment, contractor operations, or the removal of limbs greater than one inch in diameter, shall be coated as soon as possible with a tree wound dressing, unless otherwise directed by the Contracting Officer. All trimming or pruning shall be performed in a manner approved by the Contracting Officer. The use of axes or climbing spurs shall not be permitted. Trees that are to remain, either within or outside

established clearing limits, that are subsequently damaged by the Contractor and are beyond saving shall be immediately removed and replaced by the Contractor as directed by the Contracting Officer.

3.6.4 Project Site Access

The Contractor shall use only approved roadways and entry points to the project site. Restoration, repair, and general cleanup of any damage to the landscape caused by the Contractor's activities and/or equipment on or enroute to the project site shall be the responsibility of the Contractor. The Contractor shall repair any damage caused by contract activities or equipment within one week after the completion of the project, or within two weeks when access to an area is either no longer needed or not used for two weeks, restoring the area with appropriate vegetative and/or mulch as required by the Contracting Officer. It is the Contractor's responsibility to prove that continued access is required.

3.6.5 Temporary Excavation and Embankments

If the Contractor proposes to construct temporary roads or embankments in any areas not to receive final grading and/or landscaping under this contract, he or she shall submit the following to the Contracting Officer for approval:

a. A layout of all temporary roads, excavations, and embankments to be constructed.

b. Plans and cross sections of proposed embankments and their foundations, including descriptions of proposed materials.

c. A Landscape Plan showing the proposed restoration of the area shall be prepared. Removal of any necessary trees and shrubs outside the limits of existing clearing area shall be indicated. The plan shall provide for the obliteration of construction scars so as to create a reasonably natural appearance of the final condition of the project site. No unauthorized road construction, excavation or embankment construction, including disposal areas, shall be permitted.

3.6.6 Post Work Cleanup

a. The Contractor shall remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stock piles of excess or waste materials, or any other vestiges of work operations as directed by the Contracting Officer. The Contractor shall provide all excavation, filling, and plowing of roadways required to restore the area to near natural conditions and shall restore the area with appropriate vegetation and/or mulch as required by the Contracting Officer.

b. The Contractor shall remove all erosion and sedimentation controls as specified in the Storm Water Pollution Prevention Plan once the site has sufficient vegetation establishment to

prevent erosion naturally. This may require the Contractor to return to the site after the work is complete under this contract in accordance with the warranty provisions of the contract.

3.6.7 Cultural Resources

If the Contractor believes he or she has discovered any item or area of historical or archaeological interest not specified in the contract during the completion of work, the Contractor shall leave the area undisturbed and immediately report the finding to the Contracting Officer.

3.6.8 Land Use Controls

The Contractor must not disturb any Air Force property that is subject to Land Use Controls. The Contractor shall confirm with the Contracting Officer that the project site is free from environmental restrictions. All environmental restrictions are defined on the Air Force Form 813 (Request for Environmental Impact Analysis).

3.7 AFFIRMATIVE PROCUREMENT

The Government requires the use of recycle-content and recovered materials and products identified in the EPA's Comprehensive Procurement Guideline (CPG). All materials and products intended for use within this project must meet the recommended minimum content standards identified in the current CPG and Recovered Materials Advisory Notices (RMANs). If a conflict exists between material specifications elsewhere and affirmative procurement requirements, the Contractor shall immediately notify the Contracting Officer.

3.7.1 References

a. Executive Order 13101
Greening of the Government Through Waste
Prevention, Recycling, and Federal Acquisition (14 Sep 1998)

b. U.S. EPA's CPG & RMANs
EPA's Comprehensive Procurement Guideline and Federal Register Recovered Materials Advisory Notices. (Currently located at www.epa.gov/cpg)

c. Affirmative Procurement
Travis AFB Affirmative Procurement Plan (Most Plan (APP) current version).

3.7.2 Certification

a. The Contractor shall provide a written Certification of Compliance in accordance with Executing Order 13101. The certificate shall be signed by the contractor and shall state the following:

(1) The following certification statement: "I certify that products and materials used on Travis AFB Project Number comply with recommended minimum content standards for

recycled materials outlined in Executive Order 13101. Construction materials used on this project contain minimum recycled content outlined in the most current Comprehensive Procurement Guidelines and Recovered Material Advisory Notices"

(2) Itemized list of the construction materials and products used for the contract covered under this section including manufacturer, vendor , and percent recycled content or the approved exemption for noncompliance.

(3) Supporting documentation for approved exemptions on products used in the project that do not meet CPG requirements.

b. The Certification requirement above shall cover at a minimum the following construction materials and products:

(1) Asphalt

(2) Concrete

(3) Bridge Materials (Recycled Plastic Lumber)

(4) Bench Materials (Recycled Plastic Lumber)

(5) Signage Materials (Recycled Plastic)

3.8 HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT

a. Travis AFB Hazardous Waste Management Plan (Most Current Version)

b. The Contractor is responsible for management and disposal of hazardous waste in accordance with Federal, State, Local, and Base requirements. The Contractor shall obtain an EPA ID number and accept responsibility for waste disposal.

c. Contractors are responsible for the analysis, characterization and identification of hazardous wastes generated by their operation. Characterization shall be in accordance with Title 22 of the California Code of Regulations and be subject to 60 CES/CEVC review.

d. Hazardous waste treatment is not allowed on-site unless the Contractor clearly demonstrates a safe and cost-effective alternative and circumstances offer no feasible alternative. Requests for hazardous waste treatment must be approved and monitored by 60 CES/CEVC. The contractor is responsible for all costs associated with obtaining applicable permits. Applications for permits will be submitted through 60 CES/CEVC. Contractors shall not contact any regulatory agency without prior approval from 60 CES/CEV.

e. Contractors must have a working knowledge of both federal and state hazardous waste regulations. California regulations are at times more stringent than federal regulations. Some

examples are the regulations dealing with used oil, used antifreeze, used batteries, and used tires. Though classified as hazardous wastes, these items shall be disposed of through a certified recycler, rather than disposed of as a hazardous waste. Another example is the difference in the definition of an empty container. The federal definition allows three percent of the product to remain in the container. In California "empty" means all material must be removed from the container. Empty containers must be labeled as empty with the date clearly marked on the container.

f. Contractors are subject to the Solano County Department of Resource Management, California Department of Toxic Substances Control, Federal EPA and Travis Environmental Management Office audits while working on Travis AFB.

g. The Contractor shall establish a temporary Satellite Accumulation Point with the approval of 60 CES/CEVC and provide certification of proper training to handle hazardous waste. Hazardous waste shall be placed in secured, properly labeled containers provided by the contractor. Nonhazardous waste shall be placed in other containers provided by the Contractor.

h. Under no circumstances will the contractor remove any hazardous waste from Base without ensuring complete and full compliance with all applicable existing environmental laws and regulations. All shipments must be prepared in accordance with Department of Transportation Regulations (40 CFR 172).

i. Prior to removing transporting or disposing of any hazardous or non hazardous waste from the base the Contractor shall forward hazardous waste manifests, non-hazardous waste data forms, land disposal restrictions, waste profiles, laboratory analyses, and material safety data sheets to 60 CES/CEVC to obtain a review and/or signature as required.

j. Government-Supplied Information: By exception, the contractor may elect to utilize Travis AFB's US EPA ID and State Generator's ID numbers. At the contractors request, 60 CES/CEVC will provide the base's mailing address, telephone number, appropriate US EPA ID and state generator's ID numbers to be used on hazardous waste manifests generated at Travis AFB. The contractor shall ensure this information is correctly annotated on each hazardous waste manifest. All shipments utilizing the Installation's US EPA ID and State Generator's ID numbers, shall be approved for shipment by 60 CES/CEVC.

(1) Scheduling: The Contractor shall notify the Contracting Officer or the appointed contract inspector of the requirement for an inspection when the containers are 40 percent full and again when ready for shipment off-base. All documents must be correctly and completely filled out by the Contractor before contacting 60 CES/CEVC for review. All records required for hazardous waste clean up, removal, packaging, waste profiling, transportation and disposal shall

be furnished to 60 CES/CEVC by the Contractor. 60 CES/CEVC will assign the contractor with an authorized individual, to review and/or sign hazardous and non-hazardous waste manifests and other supporting documents. Contractors shall notify the government's Contracting Officer or contract inspector 72 hours in advance to obtain a 60 CES/CEVC review and coordinate signature as required. An appointment may be scheduled with only 24 hours notice if the situation is urgent, such as during spill response/clean up. Sudden realization by the Contractor that removal of accumulated waste is necessary to prevent schedule impact does not justify urgency.

(2) Individuals requesting reviews or signatures without an appointment may be turned away until the next available time on the schedule.

k. If any provision of this section is inconsistent with any applicable laws, regulations, or rules concerning the treatment, storage, or disposal of hazardous or non-hazardous wastes, such laws, regulations, and rules shall control.

3.9 SOIL MANAGEMENT

a. The contractor is responsible for management and disposal of all soil in accordance with all federal, state and local regulations.

b. Travis AFB does not have a pre-approved soil handling, staging, or containment area. This applies to both clean and contaminated soil. All soil generated must be managed on the project site.

c. Soil known or suspected to be contaminated shall be segregated and stockpiled separately from clean soil (see Attachment 1). Soil screening can be accomplished using visual inspection, odor detection, Photo Ionizing Detector (PID), or similar approved methodology.

3.9.1 Backfill

Clean soil can be reused for backfill for the associated project site. Contaminated soil cannot be reused for backfill. Relocation and/or stockpiling of either clean or contaminated soil for use elsewhere on Travis AFB is strictly prohibited.

3.9.2 Stockpiling

The contractor is responsible for maintaining the integrity (protection and containment from spreading and eroding) of soil stockpiles throughout the project duration.

a. Contaminated soil stockpiles shall be underlain and covered as described in Attachment 1, Temporary Stockpiling of Contaminated Soil.

b. For clean soil stockpiles, best management practices must be implemented to prevent storm drain impacts.

3.9.3 Soil Characterization

a. Known or suspected contaminated soil may be identified during the project design or planning process. Laboratory analysis identified as required during the planning process shall be accomplished by the contractor. Additional analysis may be required by 60 CES/CEVC.

b. Soil identified as contaminated during construction shall be stockpiled as described in paragraph STOCKPILING above and characterized in accordance with Title 22 of the California Code of Regulations. Laboratory analysis required may include CAM 17 Metals, EPA Method 8260 for volatile organics, EPA method 8270 for semi-volatile organics, TPH diesel, TPH Gasoline, TPH JP-8 and others.

3.9.4 Disposal

Disposal and transfer of both waste and hazardous waste soil shall be directly from the project site to an approved disposal facility. The contractor shall prepare a soil profile as approved by the disposal facility and appropriate shipping documents. The profile, shipping papers, hazardous waste manifest (if applicable), lab analysis and any other supporting documentation shall be provided for 60 CES/CEVC for approval prior to shipment.

3.9.5 Dumping

Dumping is not authorized on Travis AFB; all reports of illegal land disposal will be investigated by 60 CES/CEV and may be referred to appropriate regulatory authorities for enforcement. Contractors responsible for illegal dumping shall be subject to all cleanup, mitigation, and restoration costs.

3.10 AIR QUALITY

a. Contractors shall obtain the necessary air permits for their own equipment (emission sources) and provide 60 CES/CEVC with a copy of the permits for regulatory inspections.

b. Contractors shall coordinate with 60 CES/CEVC prior to installing any new stationary source or modifying an existing permitted emission source, (i.e. aircraft engine test cells, boilers, power generators, incinerators, paint/fiberglass spray booths, bead blasting booths, underground/aboveground organic liquid storage tanks, oil water separators, open burning, aeration of contaminated soil, removal of underground/aboveground storage tanks) or use of any material regulated by the Bay Area Air Quality Management District.

c. Contractors are responsible for obtaining the necessary air permits from regulatory agencies for any new or modified source. The Contractor shall coordinate with 60 CES/CEVC prior to submitting air permit applications. Copies of

original permits shall be sent directly to 60 CES/CEVC. 60 CES/CEVC will keep original copies and make necessary copies for contractors when permits arrive.

d. Contractors are responsible for ensuring environmental compliance with the federal, state and local air district requirements.

3.11 PESTICIDES

Use of pesticides under the scope of this project is authorized provided the contractor complies with requirements outlined within this paragraph.

3.11.1 References

a) Pest Management Plan Travis AFB Integrated Pest Management Plan (April 2001 or Current)

3.11.2 Submittals

a) Certificate - Applicator Certification

b) Report - Usage report

3.11.3 Approval

All pesticides, herbicides, insecticides, and rodenticides are hazardous materials. All pesticides to be used at Travis AFB must be on the AMC approved list of pesticides. Requests to use non-AMC listed pesticides shall be submitted in writing to 60 CES/CEOHB through the Contracting Office.

All requirements concerning Hazardous Material (HAZMAT) review and approval outlined in Paragraph HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT of this section apply to pesticides to be used on this project in addition to requirements of Paragraph HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT. Additionally, a copy of pesticide labels to be used under the scope of this project shall be included with HAZMAT Submittals 3.3.2.1 and 3.3.2.2.

3.11.4 Applicator Certification

Application of all pesticides shall be accomplished by certified pest control personnel or under the supervision of a certified pest control operator. The Contractor shall submit personnel certification with HAZMAT Submittals Contractor Information Sheet(s) and Material Safety Data Sheets (MSDSs). Certifications shall be from the State of California and shall be valid through duration of work to be accomplished under this contract.

3.11.5 Storage

All pesticides shall be stored, transported, and disposed of in accordance with all applicable federal, state, and local statutes, regulations, and ordinances. Protective clothing and equipment shall

be provided for and used by all persons engaged in the mixing and application of pesticides.

3.11.6 Usage Report

The Contractor shall submit a usage report no later than seven (7) days after pest control applications are completed for the project. The usage report shall include, as a minimum:

a. Name, address, and phone number of Contractor;

b. Name of the applicator;

c. Building, facility, or area treated;

d. Target pest(s) to be controlled;

e. Pesticide Name and EPA Number;

f. Active Ingredient Applied in pounds;

g. Date of the application.

3.11.7 Disposal

The Contractor is prohibited from disposing of excess pesticides on Travis AFB in any manner. The Contractor is responsible for disposing of pesticides and pesticide waste in accordance with Paragraphs HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT of this section. Excess pesticides may be applied on Travis AFB if a written request to do so is approved by the Contracting Officer.

3.12 RADIOACTIVE MATERIAL (RAM)

The Contractor shall submit for approval of the Contracting Officer a list of all permitted and non-permitted items containing RAM that shall be used in the performance of the contract.

The following information shall be provided for each item on the list:

a. Item Nomenclature

b. Item Number

c. Radioactive Isotope

d. Activity in picocurries (pCi)

e. How the item is to be used

f. MSDS

If an item or items are permitted, the Contractor shall include a copy of the permit and certification of training required to manage the permit for each item.

3.12.1 Radiation Emitters

The contractor shall submit for the approval of the Contracting Officer a list of all ionizing, non-ionizing and laser emitters that will be used in the performance of the contract. The following information shall be provided for each emitter:

3.12.2 Ionizing Emitters

a. Item Nomenclature

b. Quantity

c. Operating Power (kVp and mA)

d. Source Material

e. Manufacturer's Hazard Distances (estimated, calculated or measured)

3.12.3 Non-Ionizing Emitters

a. Item Nomenclature (including microwave ovens used in the industrial process, i.e. heating glue)

b. Quantity

c. Operating Power (range and normal)

d. Operating Frequency (range and normal)

e. Wave type (continuous or pulsed)

f. Manufacturer's Hazard Distances (estimated, calculated or measured)

3.12.4 Laser

a. Item Nomenclature

b. Quantity

c. Source Material*

d. Health Hazard Statement from the manufacturer on the hazards associated with the use of the laser*

e. MSDS* (*Class 2, Class 3 and Class 4 only)

All lasers shall meet the storage, use, labeling and handling requirements in 10 CFR.

3.13 FLUORESCENT LIGHT TUBES AND HIGH INTENSITY DISCHARGE (HID) LAMPS

a. All fluorescent tubes and HID lamps that are removed as part of this work shall be removed intact and recycled by the Contractor, to be handled as "universal waste containing

mercury". The Contractor shall provide containers for the collection of these recyclable materials. The Contractor will carefully place all light tubes and/or lamps in these containers, keep the lid securely closed at all times, and protect the containers from precipitation. Containers shall be labeled in accordance with State universal waste requirements for storage and shipping.

b. Fluorescent light tubes and HID lamps that are broken are hazardous wastes. If breakage occurs, workers can be exposed to toxic mercury vapor.

c. It is imperative that the Contractor not discard fluorescent light tubes or HID lamps on base in dumpsters or other debris collection containers.

d. Contractor shall submit weight receipts and certificates of recycling for all shipments of fluorescent lights off base.

3.14 SPILLS

a. Contractors are responsible for spills occurring on their sites or caused by their operations. Spilled material must be cleaned-up promptly and reported to 60 CES/CEV. If any amount of spilled material contacts, or has the potential to contact water, soil or any drain (sanitary or storm) the contractor shall call 911 (4-4911 if utilizing telephone on base) immediately. Spills of HAZMAT or hazardous waste shall be managed in accordance with the current 60 AMW Integrated Contingency Plan for Oil and Hazardous Substances Spill Prevention and Response for Travis AFB. Disposal of wastes generated from spill cleanup shall be the contractor's responsibility and be in accordance with paragraph SOLID WASTE MANAGEMENT and HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT of this section.

b. If a spill occurs on the installation which is beyond the contractor's ability to clean up or that impacts soil, water, or drains; the Contractor shall immediately call 911 as described above. If a spill occurs off the installation, the Contractor shall report spills related to project activities to the Department of Transportation, the National Response Center (NRC), the Installation Environmental Coordinator, and the Contracting Officer immediately following discovery and shall also comply with applicable State and Federal requirements. A written follow-up report shall be submitted to the Contracting Officer, not later than 7 days after the initial report. The written report shall be in narrative form and as a minimum include the following:

(1) Description of the material spilled (including identity, quantity, and manifest number).

(2) Whether amount spilled is EPA/state reportable and when and to whom it was reported.

(3) Exact time and location of spill, including description of the area involved.

(4) Receiving stream or waters.

(5) Cause of incident and equipment and personnel involved.

(6) Injuries or property damage.

(7) Duration of discharge.

(8) Containment procedures initiated.

(9) Summary of any communications Contractor has with press, agencies, or Government officials other than COR.

(10) Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.

ATTACHMENT 1 - TEMPORARY STAGING OF CONTAMINATED SOIL

ATTACHMENT 2 - MAP OF NATURAL RESOURCE PRESERVE AREAS ON TAFB

-- End of Section --

SECTION 16302N

UNDERGROUND TRANSMISSION AND DISTRIBUTION
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B 1	(2001) Hard-Drawn Copper Wire
ASTM B 8	(2004) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM F 512	(1995; R 2001e1) Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2005) National Electrical Safety Code

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2003) Acceptance Testing Specifications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA TC 3	(2004) Polyvinyl Chloride PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA TC 8	(1990) Extra-Strength PVC Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code
NFPA 70B	(2002) Electrical Equipment Maintenance

UNDERWRITERS LABORATORIES (UL)

UL 467	(2004) Grounding and Bonding Equipment
UL 514B	(2004) Conduit, Tubing and Cable Fittings

1.2 RELATED REQUIREMENTS

Section 02582 ELECTRICAL MANHOLE AND HANDHOLE, applies to this section with additions and modifications specified herein.

1.3 DEFINITIONS

a. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Acceptance checks and tests; G

Identify each cable for 600-volt, and medium voltage cable tests. When testing grounding electrodes and systems, identify each electrode and system for each test, as well as the resistance and soil conditions at the time the measurement were made.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Conduit

2.1.1.1 Plastic Utilities Duct for Concrete Encasement

NEMA TC 8, ASTM F 512, Type EB-35.

2.1.2 Fittings

2.1.2.1 PVC Conduit Fittings

NEMA TC 3 UL 514B.

2.1.3 Tape

2.1.3.1 Buried Warning and Identification Tape

Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried cable and conduit. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 2 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED ELECTRIC CABLE BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.1.4 Pull Rope

Shall be plastic having a minimum tensile strength of 200 pounds. Leave a minimum of 24 inches of slack at each end of the pull wires.

2.1.5 Grounding and Bonding Equipment

UL 467. Ground rods shall be copper clad steel with diameter adequate to permit driving to full length of the rod, but not less than 3/4 inch in diameter and 10 feet long unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

NFPA 70, IEEE C2 and CALPUC G.O.128.

3.1.1 Concrete

Concrete work for electrical requirements shall be 3000 psi minimum ultimate 28-day compressive strength with one inch minimum aggregate conforming to the requirements of Section 03300N CAST-IN-PLACE CONCRETE.

3.1.2 Underground Duct with Concrete Encasement

Construct underground duct lines of individual conduits encased in concrete. Except where rigid galvanized steel conduit is indicated or specified, the conduit shall be PVC Type EB-35. Do not mix different kinds of conduit in any one duct bank. Ducts shall not be smaller than 4 inches in diameter unless otherwise indicated. Concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover for ducts. Separate conduits by a minimum concrete thickness of 3 inches, except separate light and power conduits from control, signal, and telephone conduits by a minimum concrete thickness of 3 inches. Provide color, type and depth of warning tape as specified in Section 02300 EARTHWORK.

3.1.2.1 Depth of Encasement

Top of the concrete encasement shall not be less than 18 inches below grade except that under roads and pavement concrete be a minimum of 24 inches below grade.

3.1.2.2 Slope of Encasement

Duct banks shall have a continuous slope downward toward underground structures and away from buildings with a minimum pitch of 3 inches in 100 feet. Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet; sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 36 inches for ducts of 3

inches in diameter and larger. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.

3.1.2.3 Conduits

Terminate conduits in end-bells where duct lines enter underground structures. Stagger conduit joints by rows and layers to strengthen the duct bank. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in duct bank. Install spacers per manufacture's instructions, but provide a minimum of two spacer assemblies per 10 feet of duct bank. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to every other duct spacer assembly and attaching the rod to the spacer assembly.

3.1.2.4 Test Mandrel

As each section of a duct line is completed from structure to structure, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the diameter of the conduit through each conduit. After which, draw a stiff bristle brush through the conduit, until conduit is clear of particles of earth, sand, and gravel; then immediately install end plugs.

3.1.2.5 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.1.2.6 Connections to Manholes

Duct bank envelopes connecting to underground structures shall be flared to have enlarged cross-section at the manhole entrance to provide additional shear strength. Dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 12 inches in each direction. Perimeter of the duct bank opening in the underground structure shall be flared toward the inside or keyed to provide a positive interlock between the duct bank and the wall of the structure. Use vibrators when this portion of the encasement is poured to assure a seal between the envelope and the wall of the structure.

3.1.2.7 Partially Completed Duct Banks

During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud, and, and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 2 feet back into the envelope and a minimum of 2 feet beyond the end of the envelope. Provide one No. 4 bar in each corner,

3 inches from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately one footapart. Restrain reinforcing assembly from moving during concrete pouring.

3.1.3 Buried Warning and Identification Tape

Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

3.1.4 Grounding Systems

Shall be as indicated, and as required by NFPA 70 and IEEE C2.

3.1.4.1 Grounding Electrodes

Provide cone pointed driven ground rods driven full depth plus 6 inches, installed to provide an earth ground of the appropriate value for the particular equipment being grounded.

3.1.4.2 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible, excepting specifically those connections for which access for periodic testing is required, by exothermic weld or compression connector.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

b. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

3.1.4.3 Grounding Conductors

Grounding conductors shall be stranded-bare copper conforming to ASTM B 8, Class B, for sizes No. 6 AWG and larger, and shall be solid-bare copper conforming to ASTM B 1 for sizes No. 8 and smaller. Cable sheaths, cable shields, conduit, and equipment shall be grounded with No. 6 AWG.

3.1.5 Earthwork for Utilities

Section 02300 EARTHWORK.

3.1.6 Reconditioning of Surfaces

3.2 FIELD QUALITY CONTROL

As an exception to requirements that may be stated elsewhere in the contract, notify the Contracting Officer 5 working days prior to each test. Furnish labor, equipment. and incidentals required for testing, except that the Government will provide electric power required for the tests. Correct defects in the work provided by the Contractor and repeat tests until the work is in compliance with contract requirements.

3.2.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, NFPA 70B, NETA ATS, and referenced ANSI standards. Include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.2.1.1 Ground Rods

Perform ground resistance tests for ground rods before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Ground resistance shall also be measured for each piece of equipment and medium voltage cable splice to the ground electrode.Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground electrode under test.

-- End of Section --

SECTION 01770N

CLOSEOUT PROCEDURES
10/05

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

As-Built Drawings; G

Record Of Materials; G

Utility As-Built Drawings; G

Equipment/Product Warranty Tag; G

Certification of EPA Designated Items; G

1.2 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9, "Certification and Estimate of Percentage of Recovered Material Content for EPA Designated Items".

1.3 PROJECT RECORD DOCUMENTS

1.3.1 As-Built Drawings

"NFAS 5252.236-9310, Record Drawings."

1.3.2 Utility As-Built Drawings

In addition to record drawings provide for each exterior utility system a set of reproducible utility drawings, stamped and signed by a registered professional civil engineer or professional land surveyor, and two copies. Submit within ten working days after each system is in place, but no later than five working days before final inspection. Indicate exterior utilities from the termination point or point of connection to existing system. Include the following:

a. Horizontal and vertical controls for new utilities and existing utilities exposed during construction. Reference to station's horizontal and vertical control system.

b. Sufficient dimensional control for all important features such as beginning and termination points, points of connection, inverts for sewer lines and drainage collection

systems, top of pipe or conduit runs, manholes, cathodic protection appurtenances, valves, valve stem tops, backflow preventers, and other significant features.

c. Indicate type and size of all materials used in the construction of the system.

d. Indicate bearing and distance on tangent lines. On curves, indicate delta and radius of the curve, also provide X, Y, and Z coordinates at all BC and EC angle points. Indicate horizontal and vertical control for all intersecting and tangent points where utility alignment changes.

e. Tolerances: Horizontal and vertical control dimensions, plus or minus 0.10 foot. Angular control, plus or minus 0 degrees 01 minute.

1.3.3 As-Built Record of Materials

Furnish a record of materials.

Where several manufacturers' brands, types, or classes of the item listed have been used in the project, designate specific areas where each item was used. Designations shall be keyed to the areas and spaces depicted on the contract drawing. Furnish the record of materials used in the following format:

MATERIALS DESIGNATION	SPECIFICATION	MANUFACTURER	MATERIALS USED (MANUFACTURER'S DESIGNATION)	WHERE USED
Joint Seals	_____	_____	_____	_____
_____	_____	_____	_____	_____

1.4 EQUIPMENT/PRODUCT WARRANTIES

1.4.1 Equipment/Product Warranty List

Furnish to the Contracting Officer a bound and indexed notebook containing written warranties for equipment/products furnished under the contract, and prepare a complete listing of such equipment/products. The equipment/products list shall state the specification section applicable to the equipment/product, duration of the warranty therefor, start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty. The warranty period shall begin on the same date as project acceptance and shall continue for the full product warranty period. Execute the full list and deliver to the Contracting Officer prior to final acceptance of the facility.

1.4.2 Equipment Warranty Tags and Guarantor's Local Representative

Furnish with each warranty the name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and appliances are installed. The guarantor's

representative, upon request of the station representative, shall honor the warranty during the warranty period, and shall provide the services prescribed by the terms of the warranty. At the time of installation, tag each item of warranted equipment with a durable, oil- and water-resistant tag approved by the Contracting Officer. Attach tag with copper wire and spray with a clear silicone waterproof coating. Leave the date of acceptance and QC's signature blank until project is accepted for beneficial occupancy. Tag shall show the following information:

EQUIPMENT/PRODUCT WARRANTY TAG

Type of Equipment/Product _____
Warranty Period _____ From _____ To _____
Contract No. _____
Inspector's Signature _____ Date Accepted _____

Construction Contractor:
Name: _____
Address: _____
Telephone: _____

Warranty Contact: _____
Name: _____
Address: _____
Telephone: _____

STATION PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE

1.5 CLEANUP

Leave premises "broom clean." Clean debris from drainage systems. Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 02111

EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL
09/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 5434	(2003) Field Logging of Subsurface Explorations of Soil and Rock

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 302	Designation, Reportable Quantities, and Notification

1.2 MEASUREMENT AND PAYMENT

1.2.1 Measurement

Measurement for excavation and on-site transportation shall be based on the actual number of cubic yards of contaminated material in-place prior to excavation. Determination of the volume of contaminated material excavated shall be based on cross-sectional volume determination reflecting the differential between the original elevations of the top of the contaminated material and the final elevations after removal of the contaminated material. Measurement for backfilling of excavated areas shall be based on in-place cubic yards of compacted fill. Measurement for construction of stockpile areas shall be based on the number of square yards of stockpile liner constructed.

1.2.2 Payment

1.2.2.1 Excavation and Transportation

Compensation for excavation and onsite transportation of contaminated material will be paid as a unit cost. This unit cost shall include any other items incidental to excavation and handling not defined as having a specific unit cost.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Surveys; G

Separate cross-sections of each area before and after excavation and after backfilling.

SD-03 Product Data

Work Plan; G

Work Plan within 30 calender days after notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. The Contractor shall allow 30 calender days in the schedule for the Government's review. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:

a. Schedule of activities.

b. Method of excavation and equipment to be used.

c. Shoring or side-wall slopes proposed.

d. Dewatering plan.

e. Storage methods and locations for liquid and solid contaminated material.

f. Borrow sources and haul routes.

g. Decontamination procedures.

h. Spill contingency plan.

SD-06 Test Reports

Surveys; G

1.4 SURVEYS

Surveys shall be performed immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. Surveys shall also be performed immediately after backfill of each excavation. The Contractor shall provide cross-sections on 25 foot intervals and at break points for all excavated areas. Locations of confirmation samples shall also be surveyed and

shown on the drawings. Surveys shall be performed in accordance with accepted engineering standards.

1.5 REGULATORY REQUIREMENTS

1.5.1 Permits and Licenses

The Contractor shall obtain required federal, state, and local permits for excavation and storage of contaminated material. Permits shall be obtained at no additional cost to the Government.

1.6 DESCRIPTION OF WORK

The work shall consist of excavation and temporary storage of approximately 1500 to 2500 cubic yards of contaminated material. Approximate locations of contaminated material are not shown on the drawings and not known at this time. Subsurface conditions are shown on the drawings. The Contractor shall submit a Work Plan as specified in the Submittals paragraph. The Contracting Officer shall be notified within 24 hours, and before excavation, if contaminated material is discovered that has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. Ground water is approximately 10 feet below pre-excavation ground surface.

1.7 CHEMICAL TESTING

Required sampling and chemical analysis shall be conducted in accordance with Section 01455A CHEMICAL DATA QUALITY CONTROL.

1.8 SCHEDULING

The Contractor shall notify the Contracting Officer 7 calender days prior to the start of excavation of contaminated material. The Contractor shall be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

PART 2 PRODUCTS

2.1 BACKFILL

Backfill material shall be per Section 02705 BASE AND SUBBASE COURSE FOR RIGID PAVING.

2.2 SPILL RESPONSE MATERIALS

The Contractor shall provide appropriate spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

PART 3 EXECUTION

3.1 EXISTING STRUCTURES AND UTILITIES

No excavation shall be performed until site utilities have been field located. The Contractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Government. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the Contracting Officer.

3.2 CONTAMINATED MATERIAL REMOVAL

3.2.1 Excavation

Areas of contamination shall be excavated to the depth and extent of the subbase shown on the drawings and not more than 0.2 feet beyond the depth and extent of subbase shown on the drawings unless directed by the Contracting Officer. Excavation shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D 5434.

3.2.2 Shoring

If workers must enter the excavation, it shall be evaluated, shored, sloped or braced as required by EM 385-1-1 and 29 CFR 1926 section 650.

3.2.3 Dewatering

Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met.

3.3 CONTAMINATED MATERIAL STORAGE

Material shall be placed in temporary storage immediately after excavation. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.

3.3.1 Stockpiles

Stockpiles shall be constructed to isolate stored contaminated material from the environment. The maximum stockpile size shall be 1000 cubic yards. Stockpiles shall be constructed to include:

a. A chemically resistant geomembrane liner free of holes and other damage. Non-reinforced geomembrane liners shall have a minimum thickness of 20 mils. Scrim reinforced geomembrane liners shall have a minimum weight of 40 lbs. per

1000 square feet. The ground surface on which the geomembrane is to be placed shall be free of rocks greater than 0.5 inches in diameter and any other object which could damage the membrane.

b. Geomembrane cover free of holes or other damage to prevent precipitation from entering the stockpile. Non-reinforced geomembrane covers shall have a minimum thickness of 10 mils. Scrim reinforced geomembrane covers shall have a minimum weight of 26 lbs. per 1000 square feet. The cover material shall be extended over the berms and anchored or ballasted to prevent it from being removed or damaged by wind.

c. Berms surrounding the stockpile, a minimum of 12 inches in height. Vehicle access points shall also be bermed.

d. The liner system shall be sloped to allow collection of leachate. Storage and removal of liquid which collects in the stockpile, in accordance with paragraph Liquid Storage.

3.3.2 Roll-Off Units

Roll-off units used to temporarily store contaminated material shall be water tight. A cover shall be placed over the units to prevent precipitation from contacting the stored material. The units shall be located at the Contractor's Laydown area. Liquid which collects inside the units shall be removed and stored in accordance with paragraph Liquid Storage.

3.3.3 Liquid Storage

Liquid collected from excavations and stockpiles shall be temporarily stored in 500 gallon tanks. Liquid storage containers shall be water-tight and shall be located at the Contractor's Laydown area.

3.4 SPILLS

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), the Contractor shall notify the Contracting Officer immediately. If the spill exceeds the reporting threshold, the Contractor shall follow the pre-established procedures as described in the Base Wide Contingency Plan for immediate reporting and containment. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations. As directed by the Contracting Officer, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Government.

3.5 DISPOSAL REQUIREMENTS

Offsite disposal of contaminated material shall be in accordance with Section 01575T TEMPORARY ENVIRONMENTAL CONTROLS.

-- End of Section --

SECTION 02220

DEMOLITION
11/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6	(1990; R 1998) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the station daily; do not allow accumulations on airfield pavements. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Demolition plan; G

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ANSI A10.6.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris on airfield pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements

as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where aircraft safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind, jet or prop blast. Notify the Contracting Officer prior to beginning such work.

1.6.2 Existing Work

Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing work in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the location and extent of cracks and other damage and description of surface conditions that exist prior to before starting work.

1.6.3 Items to Remain in Place

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Do not overload pavements to remain. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.6.4 Existing Construction

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.6.5 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.

1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 FOREIGN OBJECT DAMAGE (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's

operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade must include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

1.9 REQUIRED DATA

The Demolition plan shall include procedures for coordination with other work in progress, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Provide procedures for safe conduct of the work in accordance with EM 385-1-1.

1.10 ENVIRONMENTAL PROTECTION

Comply with the Environmental Protection Agency requirements specified.

1.11 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Utilities and Related Equipment

3.1.1.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.1.2 Disconnecting Existing Utilities

Remove existing utilities uncovered by work and relocate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location on the station in accordance with instructions of the Contracting Officer.

3.1.2 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs including aggregate base to a depth as indicated. Provide neat sawcuts at limits of pavement removal as indicated. **PCC should be double cut to avoid spalling to the adjacent PCC to remain.**

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition work in areas occupied by structures to be demolished until all demolition in the area has been completed and debris removed. Holes, and other hazardous openings shall be filled.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.4 CLEANUP

Debris and rubbish shall be removed from construction site. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Sub Title of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified off the base. Removed materials shall not be stored on the project site.

3.5.2 Removal from Government Property

Transport waste materials removed from demolished structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

3.6 RECYCLING OF CONCRETE PAVEMENT

All Portland Cement Concrete (PCC) pavement to be demolished as part of this project shall be recycled. It is the intent of this Contract that the recycled PCC pavement not be disposed of in a landfill, but instead, be used in the production of a useful product. Recycled PCC pavement shall meet all requirements in this specifications if it used in this project. Material not meeting the requirements shall be removed from the base.

-- End of Section --

SECTION 02300

EARTHWORK
10/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1140	(2000) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4829	(2003) Standard Test Method for Expansion Index of Soils
ASTM D 698	(2000ae1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC. Satisfactory materials for grading shall be comprised of stones less than 4 inches, except for fill material for pavements which shall be comprised of stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. The Contracting Officer shall be notified of any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve shall be expressed as a percentage of the maximum density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224. To maintain the same percentage of coarse material, the "remove and

replace" procedure as described in the NOTE 8 in Paragraph 7.2 of AASHTO T 180 shall be used.

1.2.5 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.6 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.2.7 Select Granular Material

1.2.7.1 General Requirements

Select granular material shall consist of materials classified as GW, GP, SW, or SP, be free of organics and other deleterious materials, have a maximum particle size less than 2 in, and have a liquid limit less than 40 and plasticity index more than 10 but less than 20 when tested in accordance with ASTM D 4318. Satisfactory materials for grading shall be comprised of stones less than 4 in, except for fill material for pavements which shall be comprised of stones less than 3 in in any dimension.

1.2.8 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 2 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 2 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.2.9 Expansive Soils

For the purposes of this project soils are deemed to be expansive when the expansion index ASTM D 4829 is greater than 50.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring; G

Dewatering Work Plan; G

SD-03 Product Data

Utilization of Excavated Materials; G

SD-06 Test Reports

Testing

SD-07 Certificates

Testing

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

1.4 SUBSURFACE DATA

Subsurface soil boring logs are shown on the drawings. The subsoil investigation report may be examined at ROICC office at Travis Air Force Base. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.5 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.5.1 BLASTING

Blasting will not be permitted.

1.6 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.

d. Material character is indicated by the boring logs.

1.7 DEWATERING WORK PLAN

Submit procedures for accomplishing dewatering work.

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems

2.1.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psilengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.1.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.2 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to and placed in fill or embankment within the limits of

the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Such excavated material and the satisfactory material ordered as replacement shall be included in excavation. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage or designated waste areas. Unsatisfactory excavated material shall be disposed of in designated waste or spoil areas. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from other approved areas selected by the Contractor as specified.

3.1.1 Drainage Structures

Excavations shall be made to the lines, grades, and elevations shown, or as directed. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm, level, stepped, or serrated surface. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, the bottom of the excavation shall not be disturbed. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.2 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.1.3 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in-

situ material. While the excavation is open, the water level shall be maintained continuously, at least 1 foot below the working level.

3.1.4 Trench Excavation Requirements

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 5 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 5 feethigh shall be shored. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.4.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.1.4.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 4 inches below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.4.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.1.4.4 Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and

foundations as shown. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.4.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.1.5 Underground Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.2 OPENING AND DRAINAGE OF EXCAVATION

Except as otherwise permitted, excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. The Contractor shall ensure that excavation of any area, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.3 SHORING

3.3.1 General Requirements

The Contractor shall submit a Shoring and Sheeting plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Shoring, including sheet piling, shall be furnished and installed as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Shoring, bracing, and sheeting shall be removed as excavations are backfilled, in a manner to prevent caving.

3.4 GRADING AREAS

Where indicated, work will be divided into grading areas within which satisfactory excavated material shall be placed in embankments, fills, and required backfills. The Contractor shall not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Stockpiles of satisfactory and unsatisfactory shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources.

3.5 GROUND SURFACE PREPARATION

3.5.1 General Requirements

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

3.5.2 Frozen Material

Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to 1 to 3 percent over optimum moisture. Minimum subgrade density shall be as specified in paragraph TESTING.

3.6 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of off base. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material authorized to be wasted shall be disposed of off base.

3.7 BURIED TAPE AND DETECTION WIRE

3.7.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.7.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over it's entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.

3.8 BACKFILLING AND COMPACTION

Ground surface on which backfill is to be placed shall be prepared as specified in paragraph PREPARATION OF GROUND SURFACE FOR EMBANKMENTS. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraphs PREPARATION OF GROUND SURFACE FOR EMBANKMENTS, EMBANKMENTS, and SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.8.1 Trench Backfill

Trenches shall be backfilled to the grade shown.

3.8.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.8.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 6 inches loose thickness.

3.8.1.3 Bedding and Initial Backfill

Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as

specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe.

3.8.1.4 Final Backfill

The remainder of the trench, except for special materials for airfields, shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

a. Airfields: Backfill shall be placed up to the required elevation as specified. Water flooding or jetting methods of compaction will not be permitted.

3.8.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 3 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.9 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.9.1 Water Lines

Trenches shall be of a depth to provide a minimum cover of 3 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.9.2 Electrical Distribution System

Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.

3.10 EMBANKMENTS

3.10.1 Earth Embankments

Earth embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. The material shall be placed in successive horizontal layers of loose material not more than 8 inches in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those

requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.11 SUBGRADE PREPARATION

3.11.1 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. The surface of the subgrade for airfields shall not show deviations greater than 1/2 inch when tested with a 12 foot straightedge applied both parallel and at right angles to the centerline of the area. The elevation of the finish subgrade shall not vary more than 0.05 foot from the established grade and cross section.

3.11.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.11.2.1 Subgrade for Airfield Pavements

Compact top 12 inches of subgrades to 90 percent of ASTM D 1557; compact fill and backfill material to 92 percent of ASTM D 1557.

3.12 FINISHING

The surface of excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work, shall be repaired and grades re-established to the required elevations and slopes.

3.12.1 Subgrade and Embankments

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or

stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

3.13 TESTING

Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. If the Contractor elects to establish testing facilities, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved by the Contracting Officer. Field in-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.13.1 Fill and Backfill Material Gradation

One test per 500 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C 136.

3.13.2 In-Place Densities

a. One test per 500 linear feet, or fraction thereof, of each lift of embankment or backfill for airfields.

3.13.3 Check Tests on In-Place Densities

If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 as follows:

a. One check test per lift for each 1,000 linear feet, or fraction thereof, of embankment or backfill for airfields.

3.13.4 Moisture Contents

In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

3.13.5 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material to determine the optimum moisture and laboratory maximum density values. One representative test per 1,000 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.13.6 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.14 DISPOSITION OF SURPLUS MATERIAL

Surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber shall be removed from Government property as directed by the Contracting Officer. Material shipping manifesting shall be provided in accordance with Travis SMP. Soil shall be tracked with the Soil Tracking Form which must be approved by the Travis AFB Soil Program Office.

-- End of Section --

SECTION 02582

ELECTRICAL HANDHOLE
08/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI SP-66	(2004) ACI Detailing Manual

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C2	(1997) National Electrical Safety Code

ASTM INTERNATIONAL (ASTM)

ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 478	(2003a) Precast Reinforced Concrete Manhole Sections

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

1.2 RELATED REQUIREMENTS

Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION apply to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Precast handhole

1.4 QUALITY ASSURANCE

1.4.1 Precast Handhole

Provide calculations and drawings for precast handholes bearing the seal of a registered professional engineer including:

a. Material description (i.e., f'c and Fy)

b. Manufacturer's printed assembly and installation instructions

c. Design calculations

d. Reinforcing shop drawings prepared in accordance with ACI SP-66.

e. Plans and elevations showing opening and pulling-in iron locations and details.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Underground Structures

2.1.1.1 Cast-In-Place Concrete Handholes

Smooth trowel finish for floors and horizontal surfaces. Concrete shall conform to Section 03300N CAST-IN-PLACE CONCRETE.

2.1.1.2 Precast Concrete Manholes, Risers and Tops

ASTM C 478. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of precast concrete handholes.

2.1.1.3 Handholes

Provide type indicated. Top, walls, and bottom shall consist of reinforced concrete or precast concrete. Walls and bottom shall be of monolithic concrete construction. Locate duct entrances and windows near the corners of structures to facilitate cable racking. Covers shall fit the frames without undue play. Form steel and iron to shape and size with sharp lines and angles. Castings shall be free from warp and blow holes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. Install a pulling-in iron in the wall opposite each duct line entrance. Cast the words "ELECTRIC" and "TELEPHONE" in the top face of power and telephone handhole covers, respectively. Cable racks, including rack arms and insulators, shall be adequate to accommodate the cable.

2.1.1.4 Metal Frames and Covers

Provide steel frames and covers of rolled steel floor plate for handholes.

2.1.1.5 Drainage Pipe and Fittings

Cast-iron, extra strength. Drains shall be cast-iron, coated or uncoated, plain pattern, bottom outlet with perforated or slotted hinged cover.

PART 3 EXECUTION

3.1 INSTALLATION

NFPA 70 and ANSI C2 and CALPUC G.O.128.

3.1.1 Concrete

Concrete work for electrical requirements shall be 3000 psi minimum ultimate 28-day compressive strength with one-inch minimum aggregate conforming to the requirements of Section 03300N CAST-IN-PLACE CONCRETE.

3.1.2 Cast-In-Place Handholes

Underground structure shall be cast in place or may be of precast construction as specified herein. Horizontal concrete surfaces of floors shall have a smooth finish. Cure concrete by applying two coats of white pigmented membrane forming-curing compound in strict accordance with the manufacturer's printed instructions, except that precast concrete may be steam cured. Curing compound shall conform to ASTM C 309. Cast-in-place handholes shall be standard type 5 as indicated. Locate duct entrances and windows in the center of end walls (shorter) and near the corners of sidewalls (longer) to facilitate cable racking and splicing. Covers for underground structures shall fit the frames without undue play. Steel and iron shall be formed to shape and size with sharp lines and angles. Castings shall be free from wrap and blow holes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. The words "Electric" and "Telephone" shall be cast in the top face of power and telephone handhole covers, respectively.

3.1.2.1 AIRFIELD HANDHOLES

Provide electrical handholes designed for a maximum single wheel load of 50,000 lb or dual wheel load of 90,000 lb.

3.1.3 Earthwork for Utilities

Section 02300 EXCAVATION.

-- End of Section --

SECTION 02620

SUBDRAINAGE SYSTEM
02/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 27/A 27M	(2003) Steel Castings, Carbon, for General Application
ASTM A 48/A 48M	(2003) Gray Iron Castings
ASTM C 139	(2003) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 478	(2003a) Precast Reinforced Concrete Manhole Sections
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 3034	(2004) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a; R 2003) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 5034	(1995; R 2001) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM F 758	(1995; R 2000) Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

ASTM F 949	(2003) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Samples

Filter Fabric
Pipe for Subdrains

Samples of filter fabric, pipe, and pipe fittings, before starting the work.

SD-07 Certificates

Filter Fabric
Pipe for Subdrains

Certifications from the manufacturers attesting that materials meet specification requirements. Certificates are required for drain pipe, drain tile, fittings, and filter fabric.

1.3 DELIVER, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with minimum handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. During shipment and storage, filter fabric shall be wrapped in burlap or similar heavy duty protective covering. The storage area shall protect the fabric from mud, soil, dust, and debris. Filter fabric materials that are not to be installed immediately shall not be stored in direct sunlight. Plastic pipe shall be installed within 6 months from the date of manufacture unless otherwise approved.

1.3.2 Handling

Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried and not dragged to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR SUBDRAINS

Pipe for subdrains shall be of the types and sizes indicated.

2.1.1 Plastic Pipe

Plastic pipe shall contain ultraviolet inhibitor to provide protection from exposure to direct sunlight.

2.1.1.1 Polyvinyl Chloride (PVC) Pipe and Fittings

Polyvinyl chloride (PVC) pipe and fittings shall conform to ASTM F 758, Type PS 46.

2.1.1.2 Pipe Perforations

Water inlet area shall be a minimum of 0.5 square inch per linear foot. Manufacturer's standard perforated pipe which essentially meets these requirements may be substituted with prior approval of the Contracting Officer.

a. Circular Perforations in Plastic Pipe: Circular holes shall be cleanly cut not more than 3/8 inch or less than 3/16 inch in diameter and arranged in rows parallel to the longitudinal axis of the pipe. Perforations shall be approximately 3 inches center-to-center along rows. The rows shall be approximately 1-1/2 inches apart and arranged in a staggered pattern so that all perforations lie at the midpoint between perforations in adjacent rows. The rows shall be spaced over not more than 155 degrees of circumference. The spigot or tongue end of the pipe shall not be perforated for a length equal to the depth of the socket, and perforations shall continue at uniform spacing over the entire length of the pipe.

b. Slotted Perforations in Plastic Pipe: Circumferential slots shall be cleanly cut so as not to restrict the inflow of water and uniformly spaced along the length and circumference of the tubing. Width of slots shall not exceed 1/8 inch nor be less than 1/32 inch. The length of individual slots shall not exceed 1-1/4 inches on 3 inch diameter tubing, 10 percent of the tubing inside nominal circumference on 4 to 8 inch diameter tubing, and 2-1/2 inches on 10 inch diameter tubing. Rows of slots shall be symmetrically spaced so that they are fully contained in 2 quadrants of the pipe. Slots shall be centered in the valleys of the corrugations of profile wall pipe.

2.2 FILTER FABRIC

Filter fabric shall be a pervious sheet of polyester, nylon, or polypropylene filaments woven or otherwise formed into a uniform pattern with distinct and measurable openings. The filter fabric shall provide an equivalent opening size (AOS) no finer than the US Standard Sieve No. D85 and no coarser than the US Standard Sieve No. 70. AOS is defined as the number of the US Standard sieve having openings closest in size to the filter fabric openings. The fabric shall have a minimum physical strength of 400 pounds per inch in any direction when tested in accordance with ASTM D 5034 using the grab test method with 1 square inch jaws and a constant rate of travel of 12 inches per minute. Elongation at failure shall be between 30 and

70 percent. The fabric shall be constructed so that the filaments will retain their relative position with respect to each other. The edges of the fabric shall be selvaged or otherwise finished to prevent the outer material from pulling away from the fabric.

2.3 SUBDRAIN FILTER AND BEDDING MATERIAL

Subdrain filter and bedding material shall be the same material as specified in Section 02706. Filter blankets found to be dirty or otherwise contaminated shall be removed and replaced with material meeting the specific requirements, at no additional cost to the Government.

2.4 DRAINAGE STRUCTURES

2.4.1 Concrete

Except for precast concrete, reinforcement shall conform to the requirements for 3,000 psi concrete in Section 03300N CAST-IN-PLACE CONCRETE. The concrete covering over steel reinforcing shall be not less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall be at least 3 inches thick between the steel and the ground. Expansion-joint filler material shall conform to ASTM D 1751 or ASTM D 1752.

2.4.2 Mortar

Mortar for pipe joints and connections to other drainage structures shall be composed of one part by volume of portland cement and two parts of sand. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of injurious acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes from the time the ingredients are mixed with water.

2.4.3 Manholes and Appurtenances

2.4.3.1 Precast Reinforced Concrete Manhole Risers and Tops

Precast reinforced concrete manhole risers and tops shall conform to ASTM C 478.

2.4.3.2 Precast Concrete Segmental Blocks

Precast concrete segmental blocks shall conform to ASTM C 139 and shall be not more than 8 inches thick, not less than 8 inches long, and of such shape that the joints can be effectively sealed and bonded with cement mortar.

2.4.3.3 Frames and Covers or Gratings

Frames and gratings, or frames and covers, except as otherwise permitted, shall be of either cast iron with tensile strength test not less than ASTM A 48/A 48M Class 25 or steel conforming to ASTM A 27/A 27M, Class 65-35. Weight, shape, and size shall be as indicated.

2.4.3.4 Steel Ladder

A steel ladder shall be provided where the depth of a manhole exceeds 12 feet. The ladder will be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2 inches wide. Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet apart vertically, and shall be so installed as to provide at least 6 inches of space between the wall and the rungs. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M. The wall along the line of the ladder shall be vertical for its entire length.

PART 3 EXECUTION

3.1 EXCAVATION AND BEDDING FOR SUBDRAIN SYSTEMS

Trenching and excavation, including the removal of rock and unstable material, shall be in accordance with Section 02300 EARTHWORK. Bedding material shall be placed in the trench as indicated or as required as replacement materials used in those areas where unstable materials were removed. Compaction of the bedding material shall be as specified for cohesionless material in Section 02300 EARTHWORK.

3.2 MANHOLES AND FLUSHING AND OBSERVATION RISERS

3.2.1 Manholes

Manholes shall be installed complete with frames and covers or gratings at the locations and within the limits and sizes indicated. Manholes shall be constructed of one of the materials specified for manholes in paragraph DRAINAGE STRUCTURES. Joints shall be completely filled and shall be smooth and free of surplus mortar or mastic on the inside of the structure. Ladders shall be installed in manholes as indicated. Base for manholes shall be either precast or cast-in-place concrete.

3.2.2 Flushing and Observation Risers

Flushing and observation riser pipes with frames and covers shall be installed at the locations indicated. Risers shall be constructed of precast concrete, vitrified clay, or PVC pipe. Joining of riser pipes to the subdrain system shall be as indicated.

3.3 INSTALLATION OF FILTER FABRIC AND PIPE FOR SUBDRAINS

3.3.1 Installation of Filter Fabric

3.3.1.1 Trench Lining and Overlaps

Trenches to be lined with filter fabric shall be graded to obtain smooth side and bottom surfaces so that the fabric will not bridge cavities in the soil or be damaged by projecting rock. The fabric shall be laid flat but not stretched on the soil, and it shall be secured with anchor pins. Overlaps shall be at least 12 inches, and anchor pins shall be used along the overlaps.

3.3.2 Installation of Pipe for Subdrains

3.3.2.1 Pipelaying

Each pipe shall be carefully inspected before it is laid. Any defective or damaged pipe shall be rejected. No pipe shall be laid when the trench conditions or weather is unsuitable for such work. Water shall be removed from trenches by sump pumping or other approved methods. The pipe shall be laid to the grades and alignment as indicated. The pipe shall be bedded to the established gradeline. Perforations shall be centered on the bottom of the pipe. Pipes of either the bell-and-spigot type or the tongue-and-groove type shall be laid with the bell or groove ends upstream. All pipes in place shall be approved before backfilling.

3.3.2.2 Jointings

a. Polyvinyl Chloride (PVC) Pipe: Joints shall be in accordance with the requirements of ASTM D 3034, ASTM D 3212, or ASTM F 949.

3.4 INSTALLATION OF FILTER MATERIAL AND BACKFILLING FOR SUBDRAINS

After pipe for subdrains has been laid, inspected, and approved, filter material shall be placed around and over the pipe to the depth indicated. The filter material shall be placed in layers not to exceed 8 inches thick, and each layer shall be thoroughly compacted by mechanical tampers or rammers to obtain the required density. Compaction of filter material and the placement and compaction of overlying backfill material shall be in accordance with the applicable provisions specified in Section 02300 EARTHWORK.

3.5 TESTS

3.5.1 Pipe Test

Strength tests of pipe shall conform to field service test requirements of the Federal Specification, ASTM specification, or AASHTO specification covering the product (paragraph PIPE FOR SUBDRAINS).

-- End of Section --

SECTION 02704

AGGREGATE BASE COURSE FOR FLEXIBLE PAVEMENTS
09/05

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001) Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C 29/C 29M	(1997; R 2003) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(2004) Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2004) Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 1260	(2001) Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM D 75	(2003) Sampling Aggregates
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(2004) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve shall be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools

List of proposed equipment to be used in performance of construction work, including descriptive data.

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work.

SD-06 Test Reports

Sampling and Testing; G
Field Density Tests; G

Certified copies of test results for approval not less than 30 days before material is required for the work.

Calibration curves and related test results prior to using the device or equipment being calibrated.

Copies of field test results within 24 hours after the tests are performed.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved in accordance with Section 01450N CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Contracting Officer may specify the time and location of the tests. Copies of test results shall be furnished to the Contracting Officer within 24 hours of completion of the tests.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.4.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The laboratory maximum dry density and optimum moisture content shall be determined in accordance with ASTM D 1557.

1.4.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 1556, ASTM D 2167 or ASTM D 2922. For the method presented in ASTM D 1556 the base plate as shown in the drawing shall be used. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted if necessary using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed.

1.4.2.5 Wear Test

Wear tests shall be made on ABC course material in conformance with ASTM C 131.

1.4.2.6 Weight of Slag

Weight per cubic foot of slag shall be determined in accordance with ASTM C 29/C 29M on the ABC course material.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Weight per cubic foot of Slag.

1.4.3.2 In Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated. Sampling and testing of recycled concrete aggregate shall be performed at twice the specified frequency until the material uniformity is established.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Sieve Analysis shall be performed on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

d. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work shall be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.7 WAYBILLS AND DELIVERY TICKETS

Before the final statement is allowed, the Contractor shall file certified waybills and certified delivery tickets for all aggregates actually used, as specified in the Submittals paragraph.

PART 2 PRODUCTS

2.1 AGGREGATES

The ABC shall consist of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, crushed recycled concrete, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregate

Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.

c. Crushed Recycled Concrete: Crushed recycled concrete shall consist of previously hardened portland cement concrete or other concrete containing pozzolanic binder material. The recycled material shall be free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and shall be crushed and processed to meet the required gradations for coarse aggregate. The recycled concrete aggregate shall have a percent of expansion not to exceed 0.08 percent, when tested in accordance with ASTM C 1260. Recycled concrete aggregate exceeding this value shall be rejected. Crushed recycled concrete shall meet all other applicable requirements specified below.

d. Crushed Slag: Crushed slag shall be an air-cooled blast-furnace product having an air dry unit weight of not less than 70 pcf as determined by ASTM C 29/C 29M, and shall meet all the requirements specified below.

2.1.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least

30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

The specified gradation requirements shall apply to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 2
2 inch	----
1-1/2 inch	100
1 inch	60-100
1/2 inch	30-65
No. 4	20-50
No. 10	15-40
No. 40	5-25
No. 200	0-8

NOTE 1: Particles having diameters less 0.0008 inch than shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of

the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating shall be the responsibility of the Contractor. The aggregate sources shall be operated to produce the quantity and quality of materials meeting these specifications requirements in the specified time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course(s), the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 02300 EARTHWORK. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying

course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

The coarse and fine aggregates shall be mixed in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. The Contractor shall make adjustments in mixing procedures or in equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification. Adjustments to the JMF shall be limited to plus or minus 5 percent on the 1-1/2 inch and coarser sieves; plus or minus 8 percent on the 1 inch to No. 4 sieves; plus or minus 5 percent on the No. 30 sieve, and plus or minus 3 percent on the No. 200 sieve. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; this is acceptable.

3.5.2 Placing

The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall be thicker than 6 inches or thinner than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.5.3 Grade Control

The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The base course(s) shall be placed so that the completed section will be a minimum of 2 feet wider, on all sides, than the next layer that will be placed above it. Additionally, approved fill material shall be placed along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and

compacting of each layer of base course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Each layer of the base course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in paragraph SAMPLING AND TESTING. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least 100 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Compacted thickness of the base course shall be as indicated. No individual layer shall be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as

directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Traffic shall not be allowed on the completed base course.

3.7 MAINTENANCE

The base course shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of as directed. No additional payments will be made for materials that must be replaced.

-- End of Section --

SECTION 02705

BASE AND SUBBASE COURSE FOR RIGID PAVING
09/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 193	(1999) The California Bearing Ratio
AASHTO T 224	(2001) Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 29/C 29M	(1997; R 2003) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 75	(2003) Sampling Aggregates
ASTM E 11	(2004) Wire Cloth and Sieves for Testing Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment

List of proposed equipment to be used in performance of construction work, including descriptive data.

SD-06 Test Reports

Sampling and Testing
Field Density Tests

Certified copies of test results for approval not less than 30 days before material is required for the work.

Calibration curves and related test results prior to using the device or equipment being calibrated.

Copies of field test results within 24 hours after the tests are performed.

1.3 DEGREE OF COMPACTION

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles

retained on the 3/4 inch sieve shall be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved testing laboratory in accordance with Section 01450N CONTRACTOR QUALITY CONTROL. Tests shall be performed at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.4.2 Tests

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The laboratory maximum dry density and optimum moisture shall be determined in accordance with ASTM D 1557.

1.4.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. For the method presented in ASTM D 1556, the base plate, as shown in the drawing, shall be used. For the method presented in ASTM D 2922, the calibration curves shall be checked and adjusted, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and, when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration, in ASTM D 2922, on each different type of material to be tested at the beginning of a job and at intervals as directed.

1.4.2.5 Wear Test

Wear tests shall be made in conformance with ASTM C 131.

1.4.2.6 Weight of Slag

Weight per cubic foot of slag shall be determined in accordance with ASTM C 29/C 29M.

1.4.2.7 California Bearing Ratio

CBR tests shall be made in conformance with AASHTO T 193.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

a. Sieve Analysis
b. Liquid limit and plasticity index
c. Moisture-density relationship
d. Wear
e. Weight per cubic foot of Slag
f. CBR

1.4.3.2 In-Place Tests

One of each of the following tests shall be performed on samples taken from the placed and compacted subbase and rigid pavement base course. Samples shall be taken and tested at the rates indicated.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 500 square yards, or portion thereof, of completed area.

b. Sieve Analysis shall be performed on every lift of material placed and at a frequency of one sieve analysis for every 1000 square yards, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

d. The thickness of each course shall be measured at intervals providing at least one measurement for each 500 square yards or part thereof. The thickness measurement shall be made by test holes, at least 3 inches in diameter through the course.

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Tentative approval will be based on initial test results. Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted course.

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 EQUIPMENT

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Base and Subbase Course

Aggregates shall consist of crushed stone or slag, gravel, shell, sand, recycled concrete, or other sound, durable, approved materials processed and blended or naturally combined. Aggregates shall be durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 2 inches and shall be within the limits specified as follows:

Maximum Allowable Percentage by Weight
Passing Square-Mesh Sieve

Sieve Designation	No. 1
No. 10	85
No. 200	15

Particles having diameters less than 0.0008 inches shall not be in excess of 3 percent by weight of the total sample tested as determined in accordance with ASTM D 422. The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a plasticity index not greater than 8. Subbase shall have a minimum CBR of 20.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

Clearing, stripping and excavating shall be the responsibility of the Contractor. The aggregate sources shall be operated to produce the quantity and quality of materials meeting these specifications requirements in the specified time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.3 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the subbase or rigid pavement base course, the underlying course or subgrade shall be cleaned of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the overlying course. Stabilization shall be accomplished by mixing the overlying course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the overlying course is placed.

3.4 GRADE CONTROL

The finished and completed course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

3.5 MIXING AND PLACING MATERIALS

The materials shall be mixed and placed to obtain uniformity of the material at the water content specified. The Contractor shall make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated. When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall be thicker than 6 inches nor be thinner than 3 inches when compacted.

3.7 COMPACTION

Each layer of the material shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction of the subbase shall continue until each layer is compacted through the full depth to at least 100 percent of laboratory maximum density. Compaction of the rigid base course shall continue until each layer is compacted through the full depth to at least 100 percent of laboratory maximum density. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.8 EDGES

Approved material shall be placed along the edges of the subbase course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

3.9 SMOOTHNESS TEST

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.10 THICKNESS CONTROL

The completed thickness of the course(s) shall be in accordance with the thickness and grade indicated on the drawings. The completed course shall not be more than 1/2 inch deficient in thickness nor more than 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, the Contractor shall correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 1/2 inch or more thicker than shown, the course will be considered

as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness shown.

3.11 MAINTENANCE

The completed course shall be maintained in a satisfactory condition until accepted.

-- End of Section --

SECTION 02706

DRAINAGE LAYER
08/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO MP 1a	(2003) Performance Graded Asphalt Binder
AASHTO T 102	(1983; R 2000) Spot Test of Asphaltic Materials

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	(2005) Portland Cement
ASTM C 29/C 29M	(1997; R 2003) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	(1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 1856	(1995a; R 2003) Recovery of Asphalt from Solution by Abson Method
ASTM D 2172	(2001e1) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 5	(1997) Penetration of Bituminous Materials
ASTM D 75	(2003) Sampling Aggregates
ASTM E 548	(1994e1) General Criteria Used for Evaluating Laboratory Competence

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Sampling and Testing

Copies of field test results within 24 hours of completion of tests.

Approval of Materials; G

Material sources and material test results prior to field use.

Evaluation

Test section construction report.

1.3 SYSTEM DESCRIPTION

The Contractor shall build a drainage layer under the pavements as indicated on drawings and the drainage layer shall consist of Open Graded Material stabilized with cement or bituminous.

1.4 FIELD COMPACTION

Field compaction requirements shall be based on the results of a test section constructed by the Contractor, using the materials, methods,

and equipment proposed for use in the work. The test section shall meet the requirements of paragraph TEST SECTION.

1.5 EQUIPMENT

1.5.1 General Requirements

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times.

1.5.2 Placement Equipment

An asphalt paving machine shall be used to place drainage layer material. Alternate methods may be used if it can be demonstrated in the test section that these methods obtain the specified results.

1.5.3 Compaction Equipment

A dual or single smooth 10 ton (min.) vibratory drum roller which provides a maximum compactive effort without crushing the drainage layer aggregate shall be used to compact drainage layer material.

1.5.4 Bituminous Mixing Plant

The bituminous mixing plant shall be an automatic or semiautomatic controlled, commercially manufactured unit capable of producing a bituminous stabilized aggregate mixture consistent with the job-mix formula (JMF). Drum mixers shall be prequalified at the production rate to be used during full scale operations. The prequalification tests shall include extraction methods in accordance with ASTM D 2172 and recovery of the asphalt cement in accordance with ASTM D 1856. The penetration of the recovered asphalt binder shall not be less than 60 percent of the original penetration in accordance with ASTM D 5.

1.5.5 Cementitious Mixing Plant

The cementitious mixing plant shall be an automatic or semiautomatic controlled, commercially manufactured unit capable of producing a cement stabilized aggregate mixture consistent with the job mix formula determined by the Government. Aggregate and cement shall be dry mixed sufficiently to prevent cement balls from forming when water is added.

1.6 WEATHER LIMITATION

Drainage layer material shall be placed when the atmospheric temperature is above 35 degrees F. Areas of completed drainage layer or underlying courses that are damaged by freezing, rainfall, or other weather conditions or by contamination from sediments, dust, dirt, or foreign material shall be corrected by the Contractor to meet specified requirements.

1.7 SAMPLING AND TESTING

1.7.1 General Requirements

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory, or by the Contractor subject to approval. If the Contractor elects to establish testing facilities of his own, approval of such facilities shall be based on compliance with ASTM E 548, and no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved. The first inspection of the facilities will be at the expense of the Government and any subsequent inspections required because of failure of the first inspection shall be at the expense of the Contractor. Such costs will be deducted from the total amount due the Contractor. Drainage layer materials shall be tested to establish compliance with the specified requirements.

1.7.2 Sampling

Aggregate samples shall be taken in accordance with ASTM D 75. Bituminous samples shall be taken in accordance with ASTM D 140. Bituminous or cement stabilized mixture samples shall be taken using methods approved by the Contracting Officer.

1.7.3 Test Methods

1.7.3.1 Sieve Analyses

Sieve analyses shall be made in accordance with ASTM C 117 and ASTM C 136.

1.7.3.2 Density Tests

Field density tests for RDM drainage layers shall be made in accordance with ASTM D 2922 by Direct Transmission Method for the full depth of the lift. When using this method, ASTM D 3017 shall be used to determine the moisture content of the aggregate drainage layer material. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph "Calibration" of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed by the Contracting Officer.

1.7.3.3 Soundness Test

Soundness tests shall be made in accordance with ASTM C 88.

1.7.3.4 Los Angeles Abrasion Test

Los Angeles abrasion tests shall be made in accordance with ASTM C 131.

1.7.3.5 Flat or Elongated Particles Tests

Flat and/or elongated particles tests shall be made in accordance with ASTM D 4791.

1.7.3.6 Fractured Faces Tests

When aggregates are supplied from crushed gravel, approved test methods shall be used to assure the aggregate meets the requirements for fractured faces in paragraph AGGREGATES.

1.7.3.7 Bitumen Extraction

Bitumen extraction tests shall be made in accordance with ASTM D 2172.

1.7.4 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis including 0.02mm size material.

b. Flat and/or elongated particles

c. Fractured Faces

d. Los Angeles abrasion.

e. Soundness.

1.7.5 Testing Frequency

1.7.5.1 Aggregate Layer

Field density and moisture content tests shall be performed at a rate of at least one test for every 2000 square yards of completed area and not less than one test for each day's production. Sieve analyses shall be performed at a rate of at least one test for every 6000 square yards of completed area. Soundness tests, Los Angeles abrasion tests, fractured faces tests and flat and/or elongated particles tests shall be performed at the rate of one test for every 12,000 square yards of production.

1.7.5.2 Stabilized Layer

Sieve analyses shall be performed on aggregates prior to addition of asphalt or portland cement, at a rate of at least one test for every 6000 square yards of completed area and not less than one test for each days production. Extraction tests on bituminous stabilized material shall be made at the same frequency. Soundness tests, Los Angeles abrasion tests, fractured faces tests, and flat and/or elongated particles tests shall be performed at the rate of one test for every 12,000 square yards of production.

1.7.6 Approval of Materials

1.7.6.1 Aggregate

The aggregate source shall be selected at least 60 days prior to field use in the test section. Tentative approval of the source will be based on certified test results to verify that materials proposed for

use meet the contract requirements. Final approval of both the source and the material will be based on test section performance and tests for gradation, soundness, Los Angeles abrasion, flat and/or elongated particles tests and fractured faces tests. For aggregate drainage layer materials, these tests shall be performed on samples taken from the completed and compacted drainage layer course within the test section. For bituminous or cement stabilized drainage layer material, these tests shall be performed on aggregate samples taken prior to addition of bituminous or cementitious material and subsequent placement in the test section.

1.7.6.2 Bituminous or Cementitious Materials

Bituminous or cementitious sources and certified material test results shall be submitted for approval not less than 60 days prior to field use in the test section.

PART 2 PRODUCTS

2.1 GOVERNMENT APPROVAL

Asphalt or cement stabilized material will require Government notification and delivery of approved materials in accordance with paragraph BITUMINOUS OR CEMENT STABILIZED JOB-MIX FORMULA.

2.2 AGGREGATES

Aggregates shall consist of clean, sound, hard, durable, angular particles of crushed stone, crushed slag, or crushed gravel which meet the specification requirements. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf determined by ASTM C 29/C 29M. The aggregates shall be free of silt and clay as defined by ASTM D 2487, vegetable matter, and other objectionable materials or coatings.

2.2.1 Aggregate Quality

The aggregate shall have a soundness loss not greater than 18 percent weighted averaged at 5 cycles when tested in magnesium sulfate in accordance with ASTM C 88. The aggregate shall have a percentage of loss on abrasion not to exceed 40 after 500 revolutions as determined by ASTM C 131. The percentage of flat and/or elongated particles shall be determined by ASTM D 4791 with the following modifications. The aggregates shall be separated into 2 size fractions. Particles greater than 1/2 inch sieve and particles passing the 1/2 inch sieve and retained on the No. 4 sieve. The percentage of flat and/or elongated particles in either fraction shall not exceed 20. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. When the aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements. When the aggregate is supplied from crushed gravel it shall be manufactured from gravel particles, 90 percent of which by weight are retained on the maximum-size sieve listed in TABLE I. In the portion retained on each sieve specified, the crushed gravel shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least

equal to 75 percent of the smallest midsectional area of the face. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as 2 fractured faces.

2.2.2 Gradation Requirements

Drainage layer aggregates shall be well graded within the limits specified in TABLE I.

TABLE I. GRADATION OF DRAINAGE LAYER MATERIAL

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	OGM Stabilized
1-1/2 inch	100
1 inch	95-100
3/4 inch	---
1/2 inch	25-80
3/8 inch	---
No. 4	0-10
No. 8	0-5
No. 16	---

NOTE 1: The values are based on aggregates of uniform specific gravity, and the percentages passing the various sieves may require appropriate correction by the Contracting Officer when aggregates of varying specific gravities are used.

NOTE 2: Asphalt cement or portland cement will be required to stabilize the OGM.

2.3 BITUMINOUS MATERIALS

Asphalt cement to be mixed with aggregates shall conform to ASTM D 3381 viscosity Grade AASHTO MP 1a PG 30 to 50. In addition, the asphalt cement shall show a negative spot when subjected to the spot test in accordance with AASHTO T 102, using the standard naphtha specified.

2.4 CEMENTITIOUS MATERIALS

Portland cement to be mixed with aggregates shall conform to ASTM C 150, Type I, IA, II or IIA.

2.5 BITUMINOUS OR CEMENT STABILIZED JOB-MIX FORMULA

The bituminous stabilized mix shall consist of a mixture of OGM and a minimum of 2 percent asphalt cement by weight. Tolerances for bituminous stabilized material shall be maintained for field production at plus or minus 0.25 percent for asphalt cement and plus or minus 25 degrees F for mixing temperatures. The cement stabilized mix shall consist of OGM and a minimum of 200 pounds of portland cement per cubic yard with a water/cement ratio of 0.37. Based on the test section performance, the Contractor shall be responsible for

adjustments (increases) in asphalt cement or portland cement quantities to ensure the stabilized drainage layer will not rut or be disturbed by the Contractor's proposed paving method. The Contractor shall submit a job-mix formula (JMF) with the test section report for Contracting Officer approval.

PART 3 EXECUTION

3.1 STOCKPILING AGGREGATES

Aggregates shall be stockpiled at locations designated by the Contracting Officer. Stockpile areas shall be cleared and leveled prior to stockpiling aggregates. Aggregates shall be stockpiled to prevent segregation and contamination. Aggregates obtained from different sources shall be stockpiled separately.

3.2 TEST SECTION

3.2.1 Data

A test section shall be constructed to evaluate the ability to carry traffic, including placement of overlaying material and the constructability of the drainage layer including required mixing, placement, and compaction procedures. Test section data will be used by the Contracting Officer to validate the required number of compaction passes given in paragraph Compaction Requirements and the field dry density requirements for full scale production.

3.2.2 Scheduling

The test section shall be constructed a minimum of 30 days prior to the start of full scale production to provide sufficient time for an evaluation of the proposed materials, equipment and procedures including Government QA testing.

3.2.3 Location and Size

The test section shall be placed inside the production paving limits. The underlying courses and subgrade preparation, required for the pavement section, shall be completed, inspected and approved in the test section prior to constructing the drainage layer. The test section shall be a minimum of 200 feet long and two full paving lanes wide side by side.

3.2.4 Initial Testing

Certified test results, to verify that the materials proposed for use in the test section meet the contract requirements, shall be provided by the Contractor and approved by the Contracting Officer prior to the start of the test section.

3.2.5 Mixing, Placement, and Compaction

Mixing, placement, and compaction shall be accomplished using equipment meeting the requirements of paragraph EQUIPMENT. Compaction equipment speed shall be no greater than 1.5 mph. Compaction shall start from the outside edges of the paving lane and proceed to the

centerline of the lift being placed. The roller shall stay a minimum of one half the roller width from the outside edge of the drainage layer being placed until the desired density is obtained. The outside edge shall then be rolled.

3.2.6 Procedure

3.2.6.1 Bituminous/Cement Stabilized Drainage Layer

The test section shall be constructed with the same equipment used for production. Three separate areas within the test section shall be designated for sampling. All testing shall be completed in the middle third of the test section being placed. Visual examination of each sample shall be made by the contracting officer to determine if and when crushing of aggregate occurs. One sample shall be taken by the Contractor before compaction and after each subsequent compaction pass at three separate locations as directed by the Contracting Officer. Compaction shall continue for a maximum of 6 passes. A pass shall be considered the movement of a roller over the drainage layer area for one direction only. Placement procedures and equipment shall be as described herein. The contracting officer shall determine the number of passes required for compaction from the test section.

3.2.7 Evaluation

Within 10 days of completion of the test section, the Contractor shall submit to the Contracting Officer a Test Section Construction Report complete with all required test data and correlations. The Contracting Officer will evaluate the data and validate the required number of passes of the roller, the need for a final static pass of the roller, and provide the dry density for field density control during construction.

3.3 PREPARATION OF UNDERLYING COURSE

Prior to constructing the drainage layer, the underlying course shall be cleaned of all foreign materials. During construction, the underlying course shall contain no frozen material. The underlying course shall conform to Section 02705 BASE AND SUBBASE COURSE FOR RIGID PAVING. Ruts or soft yielding spots in the underlying courses having inadequate compaction and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line, and grade, and recompacting to specified density. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the drainage layer is placed.

3.4 TRANSPORTING MATERIAL

3.4.1 Aggregate Drainage Layer Material

Aggregate drainage layer material shall be transported to the site in a manner which prevents segregation and contamination of materials.

3.4.2 Bituminous Stabilized Material

Bituminous stabilized material shall be transported from the mixing plant to the site in trucks having tight, clean, smooth beds lightly coated with an approved releasing agent to prevent adhesion of the stabilized material to the truck beds. Excessive releasing agent shall be drained prior to loading. Each load shall be covered with canvas or other approved material of ample size to protect the stabilized material from the weather and to prevent loss of heat. Loads that have crusts of cold, unworkable material or have become wet will be rejected. Hauling over freshly placed material will not be permitted.

3.4.3 Cement Stabilized Material

Cement stabilized material shall be transported from the mixing plant to the site in trucks equipped with protective covers. Loads that have crusts of unworkable material or have become excessively wet will be rejected. Hauling over freshly placed material will not be permitted.

3.5 PLACING

3.5.1 General Requisites

Drainage layer material shall be placed on the underlying course in lifts of uniform thickness using equipment meeting the requirements of paragraph EQUIPMENT. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single lift. When a compacted layer in excess of 6 inches is required, the material shall be placed in lifts of equal thickness. No lift shall exceed 6 inches or be less than 3 inches when compacted. The lifts when compacted after placement shall be true to the grades or levels required with the least possible surface disturbance. Where the drainage layer is placed in more than one lift, the previously constructed lift shall be cleaned of loose and foreign material. Such adjustments in placing procedures or equipment shall be made to obtain true grades and minimize segregation and degradation of the drainage layer material. Choke stone used to stabilize the surface of the OGM shall be spread in a thin layer no thicker than 1/2 inch. The OGM shall be brought to grade and the choke stone placed and rolled as described in paragraph; TEST SECTION.

3.5.2 Placement of Stabilized Material

Bituminous stabilized material having temperatures less than 175 degrees F when dumped into the asphalt paving machine will be rejected. The paving machine shall be adjusted so that the surface of the lift being laid will be smooth and continuous without tears and pulls. Irregularities in alignment of the lift left by the paving machine shall be corrected by trimming directly behind the machine. Immediately after trimming, the edges of the lift shall be thoroughly compacted by a method approved by the Contracting Officer. Distortion of the lift during tamping will not be permitted. If more than one lift is required, the longitudinal joint in one lift shall offset that in the lift immediately below by at least 1 foot; however, the joint in the top layer shall be at the centerline of the pavement. Transverse joints in one layer shall be offset by at least 2 feet from transverse joints in the previous layer. Transverse joints in

adjacent strips shall be offset a minimum of 10 feet.At the end of each day's construction, a straight transverse construction joint shall be formed by cutting back into the completed work to form a true vertical face free of loose or shattered material. Material along construction joints not properly compacted shall be removed.

3.5.3 Placing Adjacent Stabilized Strips

The stabilized material shall be placed in consecutive adjacent strips having a minimum width of 10 feet, except where edge lanes require strips less than 10 feet to complete the area. In placing adjacent strips, the screed of the paving machine shall overlap the previously placed strip 3 to 4 inches and shall be sufficiently high so that compaction will produce a smooth, dense joint. The stabilized material placed on the edge of the previously placed strip by the paver shall be pushed back to the edge of the strip being placed. Excess stabilized material shall be removed and wasted.

3.5.4 Hand Spreading

In areas where machine spreading is impractical, drainage layer material shall be spread by hand. The material shall be spread uniformly in a loose layer to prevent segregation. The material shall conform to the required grade and thickness after compaction.

3.6 COMPACTION REQUIREMENTS

Compaction shall be accomplished using rollers meeting the requirements of paragraph EQUIPMENT and operating at a rolling speed of no greater than 1.5 miles per hour. Each lift of drainage material, including shoulders when specified under the shoulders, shall be compacted with the number of passes of the roller as follows: RDM material shall use 4 passes in the vibratory state and one in the static. Cement or Bituminous stabilized OGM material shall use 3 passes in the vibratory state and one in the static state. OGM stabilized with choke stone shall use 4 passes in the vibratory state on OGM and 2 additional roller passes on the choke stone in the vibratory state with wetting. The Contracting Officer will validate the number of roller passes after the test section is evaluated and before production starts. In addition, a minimum field dry density, as specified by the Contracting Officer, shall be maintained. If the required field dry density is not obtained, the number of roller passes shall be adjusted in accordance with paragraph DEFICIENCIES. Aggregate shall be compacted in a moisture state as determined in the test section. Excessive rolling resulting in crushing of aggregate particles shall be avoided. Choke stone used to stabilize the surface of the OGM shall be worked into the surface of the OGM by two passes of a vibratory roller and wetting. Compaction of bituminous stabilized material shall begin immediately when the material has cooled to 170 degrees F. Not more than 30 minutes shall elapse between the start of moist mixing of cement stabilized material and the start of field compaction and field compaction shall be completed within 60 minutes. In all places not accessible to the rollers, the drainage layer material shall be compacted with mechanical hand operated tampers.

3.7 FINISHING

The top surface of the drainage layer shall be finished after final compaction as determined from the test section. Adjustments in rolling and finishing procedures shall be made to obtain grades and minimize segregation and degradation of the drainage layer material.

3.8 CURING OF CEMENT STABILIZED MATERIAL

The completed cement stabilized drainage layer shall be cured with water for a period of 12 hours following completion of compaction. Curing operations shall commence within 3 hours after compaction. Curing shall consist of one of the following: 1) Sprinkling the surface of the drainage layer with a fine spray of water every 2 hours for the required 12 hour period, 2) by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap, 3)Impervious sheet curing.Curing water shall be applied so that the cement paste on the surface of the mixture will not be eroded. Water trucks will not be permitted on the completed cement stabilized drainage layer. Impervious sheeting curing shall consist of all surfaces being thoroughly wetted and then completely covered with the sheeting. Sheeting shall be at least 18 inches wider than the stabilized drainage layer surface to be covered. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 12 inches and securely weighted to prevent displacement so that it remains in contact with the surface during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears of holes appear during the curing period

3.9 EDGES OF DRAINAGE LAYER

Shoulder material shall be placed along the edges of the drainage layer course in a quantity that will compact to the thickness of the layer being constructed. At least 3 feet width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each lift of the drainage layer.

3.10 SMOOTHNESS TEST

The surface of the top lift shall not deviate more than 3/8 inch when tested with either a10 or 12 foot straightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding 3/8 inch shall be corrected in accordance with paragraph DEFICIENCIES.

3.11 THICKNESS CONTROL

The completed thickness of the drainage layer shall be within 1/2 inch of the thickness indicated. Thickness shall be measured at intervals providing at least one measurement for each 500 square yards of drainage layer. Measurements shall be made in test holes at least 3 inches in diameter unless the Contractor can demonstrate, for COR approval, that a steel rod pushed through the drainage layer clearly stops at the material interface. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected in accordance with paragraph DEFICIENCIES. Where the measured thickness is 1/2 inch

more than indicated, it will be considered as conforming to the requirements plus 1/2 inch, provided the surface of the drainage layer is within 1/2 inch of established grade. The average job thickness shall be the average of all job measurements as specified above but within 1/4 inch of the thickness shown on the drawings.

3.12 DEFICIENCIES

3.12.1 Grade and Thickness

Deficiencies in grade and thickness shall be corrected so that both grade and thickness tolerances are met. Thin layers of material shall not be added to the top surface of the drainage layer to meet grade or increase thickness. If the elevation of the top of the drainage layer is more than 1/2 inch above the plan grade it shall be trimmed to grade and finished in accordance with paragraph FINISHING. If the elevation of the top surface of the drainage layer is 1/2 inch or more below the required grade, the surface of the drainage layer shall be scarified to a depth of at least 3 inches, new material shall be added, and the layer shall be blended and recompacted to bring it to grade. Where the measured thickness of the drainage layer is more than 1/2 inch deficient, such areas shall be corrected by excavating to the required depth and replaced with new material to obtain a compacted lift thickness of at least 3 inches. The depth of required excavation shall be controlled to keep the final surface elevation within grade requirements and to preserve layer thicknesses of materials below the drainage layer.

3.12.2 Density

Density shall be considered deficient if the field dry density test results are below the dry density specified by the Contracting Officer. If the densities are deficient, the layer shall be rolled with 2 additional passes of the specified roller. If the dry density is still deficient, work will be stopped until the cause of the low dry densities can be determined and reported to the Contracting Officer.

3.12.3 Smoothness

Deficiencies in smoothness shall be corrected as if they are deficiencies in grade or thickness. All tolerances for grade and thickness shall be maintained while correcting smoothness deficiencies.

-- End of Section --

SECTION 02748

BITUMINOUS TACK AND PRIME COATS
05/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 226	(1980; R 2000) Viscosity Graded Asphalt Cement
AASHTO T 102	(1983; R 2000) Spot Test of Asphaltic Materials
AASHTO T 40	(2002) Sampling Bituminous Materials

ASTM INTERNATIONAL (ASTM)

ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 2397	(2002) Cationic Emulsified Asphalt
ASTM D 2995	(1999; R 2004) Determining Application Rate of Bituminous Distributors
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 977	(2003) Emulsified Asphalt

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Sampling and Testing

Copies of all test results for emulsified asphalt, and bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating temperature viscosity relationship for cutback asphalt, compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

1.3 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.3.1 General Requirements

Plant, equipment, machines and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory within 12 months prior to commencing work.

1.3.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number that the load produced on the base surface shall not exceed 650 psi of tire width and to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 psi and with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.3.3 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Steam heaters shall consist of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. An armored thermometer with a temperature range from 40 to 400 degrees F shall be fixed to the tank so that the temperature of the bituminous material may be determined at all times.

1.3.4 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 WEATHER LIMITATIONS

Bituminous coat shall be applied only when the surface to receive the bituminous coat is dry. Bituminous coat shall be applied only when the atmospheric temperature in the shade is 50 degrees F or above and when the temperature has not been below 35 degrees F for the 12 hours prior to application, unless otherwise directed.

1.5 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

PART 2 PRODUCTS

2.1 PRIME COAT

2.1.1 Emulsified Asphalt

Emulsified asphalt shall conform to ASTM D 977, SS-1h or ASTM D 2397, Type CSS-1h.

2.2 TACK COAT

Asphalt shall conform to ASTM D 3381 or AASHTO M 226 Grade AR 4000.

2.2.1 Emulsified Asphalt

Emulsified asphalt shall conform to ASTM D 977, Type SS-1h or ASTM D 2397, Type CSS-1h. Dilute the emulsified asphalt with equal parts of water. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T 102 using standard naphtha.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated by means of a power broom or blower supplemented with hand brooms. The surface shall be dry and clean at the time of treatment. Permission to use prime and tack oils during inclement weather periods should be given by the contracting officer.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Bituminous material for the tack coat shall be applied in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

Paving Grade Asphalts	
Viscosity Grades	
AR 4000	plus 290 degrees F
Emulsions	
SS-1h	70-160 degrees F
CSS-1h	70-160 degrees F

*These temperature ranges exceed the flash point of the material and care should be taken in their heating.

3.4 APPLICATION

3.4.1 General

Following preparation and subsequent inspection of the surface, the bituminous prime or tack coat shall be applied with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment shall be permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. All traffic, except for paving equipment used in constructing the surfacing, shall be prevented from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.4.2 Prime Coat

A prime coat shall be applied at locations shown on the Drawings. Apply the bituminous material uniformly over the surface to be treated

at a pressure range of 25 to 75 psi and at the rate of not less than 0.20 gallon not more than 0.30 gallon per square yard. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application, the building paper shall be removed and destroyed.

3.4.3 Tack Coat

Tack coat shall be applied at the locations shown on the drawings. Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate of not less than 0.05 gallon nor more than 0.15 gallon of diluted emulsion per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Prime coat shall be allowed to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material.

3.6 FIELD QUALITY CONTROL

Samples of the bituminous material used shall be obtained by the Contractor as directed, under the supervision of the Contracting Officer. The sample may be retained and tested by the Government at no cost to the Contractor.

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140 or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibration of the bituminous distributor shall be in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, three lengths of at least 100 feet for the full width of the distributor bar shall be applied to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous tack coat materials shall be applied in the amount of 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous materials shall be applied in the amount of 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Quality control sampling and testing shall be performed as required in paragraph FIELD QUALITY CONTROL.

3.8 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --

SECTION 02749

HOT-MIX ASPHALT (HMA) FOR AIRFIELDS
06/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 320	(2003) Performance-Graded Asphalt Binder
AASHTO T 308	(2004) Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method

ASPHALT INSTITUTE (AI)

AI MS-02	(6th Edition; R 1997) Mix Design Methods for Asphalt

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 1252	(2003) Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)
ASTM C 127	(2004) Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2004) Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 142	(1997; R 2004) Clay Lumps and Friable Particles in Aggregates

ASTM C 29/C 29M	(1997; R 2003) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 566	(1997; R 2004) Total Evaporable Moisture Content of Aggregate by Drying
ASTM C 88	(1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 1461	(1985; R 2001) Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 2041	(2003a) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	(2001e1) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	(2002) Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 242	(1995; R 2000e1) Mineral Filler for Bituminous Paving Mixtures
ASTM D 2489	(2002) Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	(2004) Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 2950	(1991; R 1997) Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D 3203	(1994; R 2000) Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3665	(2002) Random Sampling of Construction Materials
ASTM D 3666	(2004) Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 4125	(1994;R 2000) Asphalt Content of Bituminous Mixtures by the Nuclear Method

ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867/D 4867M	(2004) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	(1998) Mechanical Size Analysis of Extracted Aggregate
ASTM D 6307	(2004) Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D 6926	(2004) Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D 6927	(2004) Marshall Stability and Flow of Bituminous Mixtures
ASTM D 995	(1995b; R 2002) Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CDT)

CDT Test 526	(2000) Operation of California Profilograph and Evaluation of Profiles

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 171	(1994) Standard Test Method for Determining Percentage of Crushed Particles in Aggregate

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Placement Plan; G

Proposed placement plan, indicating lane widths, longitudinal joints, and transverse joints for each course or lift.

SD-03 Product Data

Mix Design; G

Proposed JMF.

Contractor Quality Control; G

Quality control plan.

SD-04 Samples

Asphalt Cement Binder

5 gallon sample for mix design verification.

Aggregates

Sufficient materials to produce 200 lb of blended mixture for mix design verification.

SD-06 Test Reports

Aggregates; G
QC Monitoring

Aggregate and QC test results.

SD-07 Certificates

Asphalt Cement Binder; G

Copies of certified test data.

Testing Laboratory

Certification of compliance.

1.3 DESCRIPTION OF WORK

The work shall consist of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses, and typical cross sections shown on the drawings. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course. The Contractor shall submit a Placement Plan as specified in the Submittals paragraph.

1.3.1 METHOD OF MEASUREMENT

Measurement of the quantity of hot-mix asphalt, per ton placed and accepted, shall be made for the purposes of assessing the pay factors stipulated in this section.

1.5 BASIS OF PAYMENT

The measured quantity of hot-mixed asphalt will be paid for and included in the lump-sum contract price. If less than 100 percent payment is due based on the pay factors stipulated in paragraph MATERIAL ACCEPTANCE AND PERCENT PAYMENT, a unit price of $90 per ton shall be used for purposes of calculating the payment reduction.

1.4 ASPHALT MIXING PLANT

Plants used for the preparation of hot-mix asphalt shall conform to the requirements of ASTM D 995 with the following changes:

a. Truck Scales. The asphalt mixture shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed at least annually by an approved calibration laboratory.

b. Testing Facilities. The Contractor shall provide laboratory facilities at the plant for the use of the Government's acceptance testing and the Contractor's quality control testing.

c. Inspection of Plant. The Contracting Officer shall have access at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. The Contractor shall provide assistance as requested, for the Governmentto procure any desired samples.

d. Storage Bins. The asphalt mixture may be stored in non-insulated storage bins for a period of time not exceeding 3 hours. The asphalt mixture may be stored in insulated storage bins for a period of time not exceeding 8 hours. The mix drawn from bins shall meet the same requirements as mix loaded directly into trucks.

1.5 HAULING EQUIPMENT

Trucks used for hauling hot-mix asphalt shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened. To deliver mix to the paver, the Contractor shall use a material transfer vehicle which shall be operated to produce continuous forward motion of the paver.

1.6 ASPHALT PAVERS

Asphalt pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable of spreading and finishing courses of hot-mix asphalt which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

1.6.1 Receiving Hopper

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped

with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

1.6.2 Automatic Grade Controls

If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A transverse slope controller shall not be used to control grade. The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet in length.

b. Taut stringline set to grade.

c. Short ski or shoe for joint matching.

d. Laser control.

1.7 ROLLERS

Rollers shall be in good condition and shall be operated at slow speeds to avoid displacement of the asphalt mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. Equipment which causes excessive crushing of the aggregate shall not be used.

1.8 WEATHER LIMITATIONS

The hot-mix asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The temperature requirements may be waived by the Contracting Officer, if requested; however, all other requirements, including compaction, shall be met.

Table 1. Surface Temperature Limitations of Underlying Course

Mat Thickness, inches	Degrees F
3 or greater	40
Less than 3	45

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The portion of material retained on the No. 4 sieve is coarse aggregate. The portion of material passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate. The portion passing the No. 200 sieve is defined as mineral filler. All aggregate test results and samples shall be submitted to the Contracting Officer at least 14 days prior to start of construction.Aggregate testing shall have been performed within 90 days of performing the mix design.

2.1.1 Coarse Aggregate

Coarse aggregate shall consist of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. The coarse aggregate particles shall meet the following requirements:

a. The percentage of loss shall not be greater than 40 percent after 500 revolutions when tested in accordance with ASTM C 131.

b. The sodium sulfate soundness loss shall not exceed 12 percent, or the magnesium sulfate soundness loss shall not exceed 18 percent after five cycles when tested in accordance with ASTM C 88.

c. At least 75 percent by weight of coarse aggregate shall have at least two or more fractured faces when tested in accordance with COE CRD-C 171. Fractured faces shall be produced by crushing.

d. The particle shape shall be essentially cubical and the aggregate shall not contain more than 20 percent, by weight, of flat and elongated particles (3:1 ratio of maximum to minimum) when tested in accordance with ASTM D 4791.

e. Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than 75 lb/cu ft when tested in accordance with ASTM C 29/C 29M.

f. Clay lumps and friable particles shall not exceed 0.3 percent, by weight, when tested in accordance with ASTM C 142.

2.1.2 Fine Aggregate

Fine aggregate shall consist of clean, sound, tough, durable particles. The aggregate particles shall be free from coatings of clay, silt, or any objectionable material and shall contain no clay balls. The fine aggregate particles shall meet the following requirements:

a. The quantity of natural sand (noncrushed material) added to the aggregate blend shall not exceed 15 percent by weight of total aggregate.

b. The individual fine aggregate sources shall have a sand equivalent value greater than 45 when tested in accordance with ASTM D 2419.

c. The fine aggregate portion of the blended aggregate shall have an uncompacted void content greater than 45.0 percent when tested in accordance with ASTM C 1252 Method A.

d. Clay lumps and friable particles shall not exceed 0.3 percent, by weight, when tested in accordance with ASTM C 142.

2.1.3 Mineral Filler

Mineral filler shall be nonplastic material meeting the requirements of ASTM D 242.

2.1.4 Aggregate Gradation

The combined aggregate gradation shall conform to gradations specified in Table 2, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table 2. Aggregate Gradations

Gradation 2

Sieve Size, inch	Percent Passing by Mass
1	---
3/4	100
1/2	76-96
3/8	69-89
No. 4	53-73
No. 8	38-60
No. 16	26-48
No. 30	18-38
No. 50	11-27
No. 100	6-18
No. 200	3-6

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to AASHTO M 320 Performance Grade (PG) 64-10. As an alternate, ASTM D 3381 Table 2, Viscosity Grade AR 4000. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer may sample and test the binder at the mix plant at any time before or during mix production. Samples for this verification testing shall be obtained by the Contractor in accordance with ASTM D 140 and in the presence of the Contracting Officer. These samples shall be furnished to the Contracting Officer for the verification testing, which shall be at no

cost to the Contractor. Samples of the asphalt cement specified shall be submitted for approval not less than 14 days before start of the test section.

2.3 MIX DESIGN

The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using hand-held hammer procedures contained in AI MS-02 and the criteria shown in Table 3. Laboratory compaction temperatures for Polymer Modified Asphalts shall be as recommended by the asphalt cement manufacturer. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867/D 4867M is less than 75, the aggregates shall be rejected or the asphalt mixture treated with an anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an antistrip agent is required, it shall be provided by the Contractor at no additional cost. Sufficient materials to produce 200 pound of blended mixture shall be provided to the Contracting Officer for verification of mix design at least 14 days prior to construction of test section.

2.3.1 JMF Requirements

The job mix formula shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

a. Percent passing each sieve size.

b. Percent of asphalt cement.

c. Percent of each aggregate and mineral filler to be used.

d. Asphalt viscosity grade, penetration grade, or performance grade.

e. Number of blows of hammer per side of molded specimen.

f. Laboratory mixing temperature.

g. Lab compaction temperature.

h. Temperature-viscosity relationship of the asphalt cement.

i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.

j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-02.

k. Specific gravity and absorption of each aggregate.

l. Percent natural sand.

m. Percent particles with two or more fractured faces (in coarse aggregate).

n. Fine aggregate angularity.

o. Percent flat or elongated particles (in coarse aggregate).

p. Tensile Strength Ratio.

q. Antistrip agent (if required) and amount.

r. List of all modifiers and amount.

s. Correlation of hand-held hammer with mechanical hammer.

t. Percentage and properties (asphalt content, binder properties, and aggregate properties) of RAP in accordance with paragraph RECYCLED HOT-MIX ASPHALT, if RAP is used.

Table 3. Marshall Design Criteria

Test Property	50 Blow Mix
Stability, pounds minimum	1350 (1)
Flow, 0.01 inch	8-18 (2)
Air voids, percent	3-5
Percent Voids in mineral aggregate (minimum)	See Table 4
Dust Proportion (3)	0.8-1.2
TSR, minimum percent	75

(1) This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.

(2) The flow requirement is not applicable for Polymer Modified Asphalts

(3) Dust Proportion is calculated as the aggregate content, expressed as a percent of mass, passing the No. 200 sieve, divided by the effective asphalt content, in percent of total mass of the mixture.

Table 4. Minimum Percent Voids in Mineral Aggregate (VMA) (4)

Aggregate (See Table 2)	Minimum VMA, percent
Gradation 2	14.0

(4) Calculate VMA in accordance with AI MS-02, based on ASTM D 2726 bulk specific gravity for the aggregate.

2.3.2 Adjustments to JMF

The JMF for each mixture shall be in effect until a new formula is approved in writing by the Contracting Officer. Should a change in sources of any materials be made, a new mix design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the JMF within the limits specified below to optimize mix volumetric properties. Adjustments to the JMF shall be limited to plus or minus 4 percent on the No. 4 and coarser sieves; plus or minus 3 percent on the No. 8 to No. 50 sieves; and plus or minus 1 percent on the No. 100 sieve. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; this is acceptable. Adjustments to the JMF shall be limited to plus or minus 1.0 percent on the No. 200 sieve. The resulting aggregate grading on the No. 200 sieve shall not be outside the limits shown in Table 2. Asphalt content adjustments shall be limited to plus or minus 0.40 of binder content. If adjustments are needed that exceed these limits, a new mix design shall be developed.

2.4 RECYCLED HOT MIX ASPHALT

Recycled HMA shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt cement. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 2 inches. The recycled HMA mix shall be designed using procedures contained in AI MS-02. The job mix shall meet the requirements of paragraph MIX DESIGN. RAP should only be used for shoulder surface course mixes and for any intermediate courses. The amount of RAP shall be limited to 30 percent.

2.4.1 RAP Aggregates and Asphalt Cement

The blend of aggregates used in the recycled mix shall meet the requirements of paragraph AGGREGATES. The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D 2172 using the appropriate dust correction procedure.

2.4.2 RAP Mix

The blend of new asphalt cement and the RAP asphalt binder shall meet the penetration or viscosity requirements in paragraph ASPHALT CEMENT BINDER. The virgin asphalt cement shall not be more than two standard asphalt material grades different than that specified in paragraph ASPHALT CEMENT BINDER.

PART 3 EXECUTION

3.1 PREPARATION OF ASPHALT BINDER MATERIAL

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates. Performance Graded (PG) asphalts shall be within the temperature range of 265 to 320 degrees F when added to the aggregates.

3.2 PREPARATION OF MINERAL AGGREGATE

The aggregate for the mixture shall be heated and dried prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F when the asphalt cement is added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D 1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of dust and debris. A prime coat and/or tack coat shall be applied in accordance with the contract specifications.

3.5 TEST SECTION

Prior to full production, the Contractor shall place a test section for each JMF used. The contractor shall construct a test section 250 - 500 feet long and two paver passes wide placed in two lanes, with a longitudinal cold joint. The test section shall be of the same depth as the course which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same equipment to be used on the remainder of the course represented by the test section. The test section shall be placed as part of the project pavement as approved by the Contracting Officer.

3.5.1 Sampling and Testing for Test Section

One random sample shall be taken at the plant, triplicate specimens compacted, and tested for stability, flow, and laboratory air voids. A portion of the same sample shall be tested for theoretical maximum density (TMD), aggregate gradation and asphalt content. Four randomly selected cores shall be taken from the finished pavement mat, and four from the longitudinal joint, and tested for density. Random sampling shall be in accordance with procedures contained in ASTM D 3665. The test results shall be within the tolerances shown in Table 5 for work to continue. If all test results meet the specified requirements, the test section shall remain as part of the project pavement. If test results exceed the tolerances shown, the test section shall be removed and replaced at no cost to the Government and another test section shall be constructed.

Table 5. Test Section Requirements for Material and Mixture Properties

Property	Specification Limit
Aggregate Gradation-Percent Passing (Individual Test Result)	
No. 4 and larger	JMF plus or minus 8
No. 8, No. 16, No. 30, and No. 50	JMF plus or minus 6
No. 100 and No. 200	JMF plus or minus 2.0
Asphalt Content, Percent (Individual Test Result)	JMF plus or minus 0.5
Laboratory Air Voids, Percent (Average of 3 specimens)	JMF plus or minus 1.0
VMA, Percent (Average of 3 specimens)	15 minimum
Stability, pounds (Average of 3 specimens)	1350 minimum
Flow, 0.01 inches (Average of 3 specimens)	8 - 18
Mat Density, Percent of TMD (Average of 4 Random Cores)	92.0 - 96.0
Joint Density, Percent of TMD (Average of 4 Random Cores)	90.5 - 92.5

3.5.2 Additional Test Sections

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Full production shall not begin until an acceptable section has been constructed and accepted.

3.6 TESTING LABORATORY

The laboratory used to develop the JMF and for Government acceptance testing shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.7 TRANSPORTING AND PLACING

3.7.1 Transporting

The hot-mix asphalt shall be transported from the mixing plant to the site in clean, tight vehicles. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F.

3.7.2 Placing

The mix shall be placed and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, the mixture shall be placed to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.8 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor, with the exception that the Contractor shall not apply more than three passes with a vibratory roller in the vibrating mode. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.9 JOINTS

The formation of joints shall be made ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.9.1 Transverse Joints

The roller shall not pass over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. The cutback material shall be removed from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.9.2 Longitudinal Joints

Longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing the adjacent lane), or otherwise defective, shall be cut back a maximum of 3 inches from the top edge of the lift with a cutting wheel to expose a clean, sound vertical surface for the full depth of the course. All cutback material shall be removed from the project. All contact surfaces shall be given a light tack coat of asphalt material prior to placing any fresh mixture against the joint. The Contractor will be allowed to use an alternate method if it can be demonstrated that density, smoothness, and texture can be met.

3.10 CONTRACTOR QUALITY CONTROL

3.10.1 General Quality Control Requirements

The Contractor shall develop an approved Quality Control Plan. Hot-mix asphalt for payment shall not be produced until the quality control plan has been approved. The plan shall address all elements which affect the quality of the pavement including, but not limited to:

a. Mix Design

b. Aggregate Grading

c. Quality of Materials

d. Stockpile Management

e. Proportioning

f. Mixing and Transportation

g. Mixture Volumetrics

h. Moisture Content of Mixtures

i. Placing and Finishing

j. Joints

k. Compaction

l. Surface Smoothness

m. Truck bed release agent

3.10.2 Testing Laboratory

The Contractor shall provide a fully equipped asphalt laboratory located at the plant or job site. It shall be equipped with heating and air conditioning units to maintain a temperature of 75 plus or minus 5 degrees F. Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Contracting Officer shall be permitted unrestricted access to inspect the Contractor's laboratory facility, to witness quality control activities, and to perform any check testing desired. The Contracting Officer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to adversely affect test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are corrected.

3.10.3 Quality Control Testing

The Contractor shall perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but shall not be limited to, tests for the control of asphalt content, aggregate gradation, temperatures,

aggregate moisture, moisture in the asphalt mixture, laboratory air voids, stability, flow, in-place density, grade and smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

3.10.3.1 Asphalt Content

A minimum of two tests to determine asphalt content will be performed per lot (a lot is defined in paragraph MATERIAL ACCEPTANCE AND PERCENT PAYMENT) by one of the following methods: extraction method in accordance with ASTM D 2172, Method A or B, the ignition method in accordance with the AASHTO T 308, ASTM D 6307, or the nuclear method in accordance with ASTM D 4125, provided each method is calibrated for the specific mix being used. For the extraction method, the weight of ash, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

3.10.3.2 Aggregate Gradation and Specific Gravity

Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of recovered aggregate in accordance with ASTM D 5444 or ASTM D 6307. For batch plants, aggregates shall be tested in accordance with ASTM C 136 using actual batch weights to determine the combined aggregate gradation of the mixture. The specifc gravity of each aggregate size grouping shall be determined for each 20,000 tons in accordance with ASTM C 127 or ASTM C 128.

3.10.3.3 Temperatures

Temperatures shall be checked at least four times per lot, at necessary locations, to determine the temperature at the dryer, the asphalt cement in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

3.10.3.4 Aggregate Moisture

The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

3.10.3.5 Moisture Content of Mixture

The moisture content of the mixture shall be determined at least once per lot in accordance with ASTM D 1461 or an approved alternate procedure.

3.10.3.6 Laboratory Air Voids, Marshall Stability and Flow

Mixture samples shall be taken at least four times per lot and compacted into specimens, using 50 blows per side with the Marshall hand-heldhammer as described in ASTM D 6926. After compaction, the laboratory air voids of each specimen shall be determined, as well as the Marshall stability and flow, as described in ASTM D 6927.

3.10.3.7 In-Place Density

The Contractor shall conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge may be used to monitor pavement density in accordance with ASTM D 2950.

3.10.3.8 Grade and Smoothness

The Contractor shall conduct the necessary checks to ensure the grade and smoothness requirements are met in accordance with paragraph MATERIAL ACCEPTANCE AND PERCENT PAYMENT.

3.10.3.9 Additional Testing

Any additional testing, which the Contractor deems necessary to control the process, may be performed at the Contractor's option.

3.10.3.10 QC Monitoring

The Contractor shall submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

3.10.4 Sampling

When directed by the Contracting Officer, the Contractor shall sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.10.5 Control Charts

For process control, the Contractor shall establish and maintain linear control charts on both individual samples and the running average of last four samples for the parameters listed in Table 6, as a minimum. These control charts shall be posted as directed by the Contracting Officer and shall be kept current at all times. The control charts shall identify the project number, the test parameter being plotted, the individual sample numbers, the Action and Suspension Limits listed in Table 6 applicable to the test parameter being plotted, and the Contractor's test results. Target values from the JMF shall also be shown on the control charts as indicators of central tendency for the cumulative percent passing, asphalt content, and laboratory air voids parameters. When the test results exceed either applicable Action Limit, the Contractor shall take immediate steps to bring the process back in control. When the test results exceed either applicable Suspension Limit, the Contractor shall halt production until the problem is solved. The Contractor shall use the control charts as part of the process control system for identifying trends so that potential problems can be corrected before they occur. Decisions concerning mix modifications shall be made based on analysis of the results provided in the control charts. The Quality Control Plan shall indicate the appropriate action which shall be taken to

bring the process into control when certain parameters exceed their Action Limits.

Table 6. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts

Parameter to be Plotted	Individual Samples Action Limit	Individual Samples Suspension Limit	Running Average of Last Four Samples Action Limit	Running Average of Last Four Samples Suspension Limit
No. 4 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	6	8	4	5
No. 30 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	4	6	3	4
No. 200 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	1.4	2.0	1.1	1.5
Stability, pounds (minimum) 50 blow JMF	950	830	1350	1230
Flow, 0.01 inches 50 blow JMF	8 min. 18 max.	7 min. 19 max.	9 min. 17 max.	8 min. 18 max.
Asphalt content, % deviation from JMF target; plus or minus value	0.4	0.5	0.2	0.3
Laboratory Air Voids, % deviation from JMF target value	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Mat Density, % of TMD	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Joint Density, % of TMD	No specific action and suspension limits set since this parameter is used to determine percent payment			

3.11 MATERIAL ACCEPTANCE AND PERCENT PAYMENT

The Government's quality assurance (QA) program for this project, specified below, will be separate and distinct from the Contractor's quality control (QC) program specified above. Testing for

acceptability of work will be performed by the Government or by an independent laboratory hired by the Contracting Officer, except for grade and smoothness testing which shall be performed by the Contractor. Acceptance of the plant produced mix and in-place requirements will be on a lot to lot basis. A standard lot for all requirements will be equal to 2000 short tons. Where appropriate, adjustment in payment for individual lots of hot-mix asphalt will be made based on in-place density, laboratory air voids, grade and smoothness in accordance with the following paragraphs. Grade and surface smoothness determinations will be made on the lot as a whole. Exceptions or adjustments to this will be made in situations where the mix within one lot is placed as part of both the intermediate and surface courses, thus grade and smoothness measurements for the entire lot cannot be made. In order to evaluate laboratory air voids and in-place (field) density, each lot will be divided into four equal sublots.

3.11.1 Percent Payment

When a lot of material fails to meet the specification requirements for 100 percent pay as outlined in the following paragraphs, that lot shall be removed and replaced, or accepted at a reduced price which will be computed by multiplying the unit price by the lot's pay factor. The lot pay factor is determined by taking the lowest computed pay factor based on either laboratory air voids, in-place density, grade or smoothness (each discussed below). Pay factors based on different criteria (i.e., laboratory air voids and in-place density) of the same lot will not be multiplied together to get a lower lot pay factor. At the end of the project, an average of all lot pay factors will be calculated. If this average lot pay factor exceeds 95.0 percent and no individual lot has a pay factor less than 75.1 percent, then the percent payment for the entire project will be 100 percent of the unit bid price. If the average lot pay factor is less than 95.0 percent, then each lot will be paid for at the unit price multiplied by the lot's pay factor. For any lots which are less than 2000 short tons, a weighted lot pay factor will be used to calculate the average lot pay factor.

3.11.2 Sublot Sampling

One random mixture sample for determining laboratory air voids, theoretical maximum density, and for any additional testing the Contracting Officer desires, will be taken from a loaded truck delivering mixture to each sublot, or other appropriate location for each sublot. All samples will be selected randomly, using commonly recognized methods of assuring randomness conforming to ASTM D 3665 and employing tables of random numbers or computer programs. Laboratory air voids will be determined from three laboratory compacted specimens of each sublot sample in accordance with ASTM D 6926. The specimens will be compacted within 2 hours of the time the mixture was loaded into trucks at the asphalt plant. Samples will not be reheated prior to compaction and insulated containers will be used as necessary to maintain the temperature.

3.11.3 Additional Sampling and Testing

The Contracting Officer reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. The cost of any additional testing will be paid for by the Government. Testing in these areas will be treated as a separate lot. Payment will be made for the quantity of HMA represented by these tests in accordance with the provisions of this section.

3.11.4 Laboratory Air Voids and Theoretical Maximum Density

Laboratory air voids will be calculated in accordance with ASTM D 3203 by determining the Marshall density of each lab compacted specimen using the laboratory-prepared, thoroughly dry method in ASTM D 2726 and determining the theoretical maximum density (TMD) of every other sublot sample using ASTM D 2041. Laboratory air void calculations for each sublot will use the latest theoretical maximum density values obtained, either for that sublot or the previous sublot. The mean absolute deviation of the four laboratory air void contents (one from each sublot) from the JMF air void content will be evaluated and a pay factor determined from Table 7. All laboratory air void tests will be completed and reported within 24 hours after completion of construction of each lot. The TMD is also used for computation of compaction, as required in paragraph: Mat and Joint Densities.

3.11.5 Mean Absolute Deviation

An example of the computation of mean absolute deviation for laboratory air voids is as follows: Assume that the laboratory air voids are determined from 4 random samples of a lot (where 3 specimens were compacted from each sample). The average laboratory air voids for each sublot sample are determined to be 3.5, 3.0, 4.0, and 3.7. Assume that the target air voids from the JMF is 4.0. The mean absolute deviation is then:

Mean Absolute Deviation = (|3.5 - 4.0| + |3.0 - 4.0| + |4.0 - 4.0| + |3.7 - 4.0|)/4

= (0.5 + 1.0 + 0.0 + 0.3)/4 = (1.8)/4 = 0.45

The mean absolute deviation for laboratory air voids is determined to be 0.45. It can be seen from Table 7 that the lot's pay factor based on laboratory air voids, is 100 percent.

Table 7. Pay Factor Based on Laboratory Air Voids

Mean Absolute Deviation of Lab Air Voids from JMF	Pay Factor, %
0.60 or less	100
0.61 - 0.80	98
0.81 - 1.00	95
1.01 - 1.20	90
Above 1.20	reject (0)

3.11.6 In-place Density

3.11.6.1 General Density Requirements

For determining in-place density, one random core (4 inches or 6 inches in diameter) will be taken by the Government from the mat (interior of the lane) of each sublot, and one random core will be taken from the joint (immediately over joint) of each sublot. Each random core will be full thickness of the layer being placed. When the random core is less than 1 inch thick, it will not be included in the analysis. In this case, another random core will be taken. After air drying in accordance with ASTM D 2726 for laboratory-prepared, thoroughly dry specimens, cores obtained from the mat and from the joints will be used for in-place density determination.

3.11.6.2 Mat and Joint Densities

The average in-place mat and joint densities are expressed as a percentage of the average TMD for the lot. The average TMD for each lot will be determined as the average TMD of the two random samples per lot. The average in-place mat density and joint density for a lot are determined and compared with Table 8 to calculate a single pay factor per lot based on in-place density, as described below. First, a pay factor for both mat density and joint density are determined from Table 8. The area associated with the joint is then determined and will be considered to be 10 feet wide times the length of completed longitudinal construction joint in the lot. This area will not exceed the total lot size. The length of joint to be considered will be that length where a new lane has been placed against an adjacent lane of hot-mix asphalt pavement, either an adjacent freshly paved lane or one paved at any time previously. The area associated with the joint is expressed as a percentage of the total lot area. A weighted pay factor for the joint is determined based on this percentage (see example below). The pay factor for mat density and the weighted pay factor for joint density is compared and the lowest selected. This selected pay factor is the pay factor based on density for the lot. When the TMD on both sides of a longitudinal joint is different, the average of these two TMD will be used as the TMD needed to calculate the percent joint density. All density results for a lot will be completed and reported within 24 hours after the construction of that lot.

Table 8. Pay Factor Based on In-place Density

Average Mat Density (4 Cores)	Pay Factor, %	Average Joint Density (4 Cores)
94.0 - 96.0	100.0	Above 92.5
93.9	100.0	92.4
93.8 or 96.1	99.9	92.3
93.7	99.8	92.2
93.6 or 96.2	99.6	92.1
93.5	99.4	92.0
93.4 or 96.3	99.1	91.9
93.3	98.7	91.8
93.2 or 96.4	98.3	91.7
93.1	97.8	91.6
93.0 or 96.5	97.3	91.5

92.9	96.3	91.4
92.8 or 96.6	94.1	91.3
92.7	92.2	91.2
92.6 or 96.7	90.3	91.1
92.5	87.9	91.0
92.4 or 96.8	85.7	90.9
92.3	83.3	90.8
92.2 or 96.9	80.6	90.7
92.1	78.0	90.6
92.0 or 97.0	75.0	90.5
below 92.0, above 97.0	0.0 (reject)	below 90.5

3.11.6.3 Pay Factor Based on In-place Density

An example of the computation of a pay factor (in I-P units only) based on in-place density, is as follows: Assume the following test results for field density made on the lot: (1) Average mat density = 93.2 percent (of lab TMD). (2) Average joint density = 91.5 percent (of lab TMD). (3) Total area of lot = 30,000 square feet. (4) Length of completed longitudinal construction joint = 2000 feet.

a. Step 1: Determine pay factor based on mat density and on joint density, using Table 8:

Mat density of 93.2 percent = 98.3 pay factor.

Joint density of 91.5 percent = 97.3 pay factor.

b. Step 2: Determine ratio of joint area (length of longitudinal joint x 10 ft) to mat area (total paved area in the lot): Multiply the length of completed longitudinal construction joint by the specified 10 ft. width and divide by the mat area (total paved area in the lot).

(2000 ft. x 10 ft.)/30000 sq.ft. = 0.6667 ratio of joint area to mat area (ratio).

c. Step 3: Weighted pay factor (wpf) for joint is determined as indicated below:

wpf = joint pay factor + (100 - joint pay factor) (1 - ratio)
wpf = 97.3 + (100-97.3) (1-.6667) = 98.2%

d. Step 4: Compare weighted pay factor for joint density to pay factor for mat density and select the smaller:

Pay factor for mat density: 98.3%. Weighted pay factor for joint density: 98.2%

Select the smaller of the two values as pay factor based on density: 98.2%

3.11.7 Grade

Within 5 working days after completion of a particular lot incorporating the final wearing course, the Contractor shall test the final wearing surface of the pavement for conformance with specified

plan grade requirements. All testing shall be performed in the presence of the Contracting Officer. The final wearing surface of pavement shall conform to the elevations and cross sections shown and shall vary not more than 0.03 foot for runways or 0.05 foot for taxiways and aprons from the plan grade established and approved at site of work. Finished surfaces at juncture with other pavements shall coincide with finished surfaces of abutting pavements. Deviation from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. The grade will be determined by running lines of levels at intervals of 25 feet, or less, longitudinally and transversely, to determine the elevation of the completed pavement surface. Detailed notes of the results of the testing shall be kept and a copy furnished to the Government immediately after each day's testing. When more than 5 percent of all measurements made within a lot are outside the 0.03 or 0.05 foot tolerance, the pay factor based on grade for that lot will be 95 percent. In areas where the grade exceeds the tolerance by more than 50 percent, the Contractor shall remove the surface lift full depth; the Contractor shall then replace the lift with hot-mix asphalt to meet specification requirements, at no additional cost to the Government. Diamond grinding may be used to remove high spots to meet grade requirements. Skin patching for correcting low areas or planing or milling for correcting high areas will not be permitted.

3.11.8 Surface Smoothness

The Contractor shall use both of the following methods to test and evaluate surface smoothness of the pavement. All testing shall be performed in the presence of the Contracting Officer. Detailed notes of the results of the testing shall be kept and a copy furnished to the Government immediately after each day's testing. The profilograph method shall be used for all longitudinal and transverse testing, except where the runs would be less than 200 feet in length and the ends where the straightedge shall be used. Where drawings show required deviations from a plane surface (crowns, drainage inlets, etc.), the surface shall be finished to meet the approval of the Contracting Officer.

3.11.8.1 Smoothness Requirements

a. Straightedge Testing: The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified in Table 9 when checked with an approved 12 foot straightedge.

Table 9. Straightedge Surface Smoothness--Pavements

Pavement Category	Direction of Testing	Tolerance, inches
All other airfields and helicopter paved areas	Longitudinal	1/4
	Transverse	1/4

b. Profilograph Testing: The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavement

shall have a Profile Index not greater than specified in Table 10 when tested with an approved California-type profilograph. If the extent of the pavement in either direction is less than 200 feet, that direction shall be tested by the straightedge method and shall meet requirements specified above.

Table 10. Profilograph Surface Smoothness--Pavements

Pavement Category	Direction of Testing	Maximum Specified Profile Index (inch/mile)
All Other Airfield & Helicopter Paved Areas	Longitudinal	9
	Transverse	9

3.11.8.2 Testing Method

After the final rolling, but not later than 24 hours after placement, the surface of the pavement in each entire lot shall be tested by the Contractor in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. Separate testing of individual sublots is not required. If any pavement areas are ground, these areas shall be retested immediately after grinding. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines. The transverse lines shall be 15 feet or less apart, as directed. The longitudinal lines shall be at the centerline of each paving lane for lines less than 20 feet and at the third points for lanes 20 feet or greater. Other areas having obvious deviations shall also be tested. Longitudinal testing lines shall be continuous across all joints.

a. Straightedge Testing. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points.

b. Profilograph Testing. Profilograph testing shall be performed using approved equipment and procedures described in CDT Test 526. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must-grind" bumps and the Profile Index for the pavement. The "blanking band" shall be 0.2 inches wide and the "bump template" shall span 1 inch with an offset of 0.4 inch. The profilograph shall be operated by an approved, factory-trained operator on the alignments specified above. A copy of the reduced tapes shall be furnished the Government at the end of each day's testing.

3.11.8.3 Payment Adjustment for Smoothness

a. Straightedge Testing. Location and deviation from straightedge for all measurements shall be recorded. When between 5.0 and 10.0 percent of all measurements made within a lot exceed the tolerance specified in paragraph Smoothness Requirements above, after any reduction of high spots or removal and replacement, the computed pay factor for that lot based on surface smoothness, will be 95 percent. When more than 10.0 percent of all measurements exceed the tolerance, the computed pay factor will be 90 percent. When between 15.0 and 20.0 percent of all measurements exceed the tolerance, the computed pay factor will be 75 percent. When 20.0 percent or more of the measurements exceed the tolerance, the lot shall be removed and replaced at no additional cost to the Government. Regardless of the above, any small individual area with surface deviation which exceeds the tolerance given above by more than 50 percent, shall be corrected by diamond grinding to meet the specification requirements above or shall be removed and replaced at no additional cost to the Government.

b. Profilograph Testing. Location and data from all profilograph measurements shall be recorded. When the Profile Index of a lot exceeds the tolerance specified in paragraph Smoothness Requirements above by 1.0 inch/mile, but less than 2.0 inches/mile, after any reduction of high spots or removal and replacement, the computed pay factor for that lot based on surface smoothness will be 95 percent. When the Profile Index exceeds the tolerance by 2.0 inches/mile, but less than 3.0 inches/mile, the computed pay factor will be 90 percent. When the Profile Index exceeds the tolerance by 3.0 inches/mile, but less than 4.0 inches/mile, the computed pay factor will be 75 percent. When the Profile Index exceeds the tolerance by 4.0 inches/mile or more, the lot shall be removed and replaced at no additional cost to the Government. Regardless of the above, any small individual area with surface deviation which exceeds the tolerance given above by more than 5.0 inches/mile or more, shall be corrected by grinding to meet the specification requirements above or shall be removed and replaced at no additional cost to the Government.

c. Bumps ("Must Grind" Areas). Any bumps ("must grind" areas) shown on the profilograph trace which exceed 0.4 inch in height shall be reduced by diamond grinding until they do not exceed 0.3 inch when retested. Such grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. The following will not be permitted: (1) skin patching for correcting low areas, (2) planing or milling for correcting high areas. At the Contractor's option, pavement areas, including ground areas, may be rechecked with the profilograph in order to record a lower Profile Index.

-- End of Section --

SECTION 02754

CONCRETE PAVEMENTS FOR SMALL PROJECTS (LESS THAN 2500 CY)

PART 1 GENERAL

1.1 REFERENCES 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. AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI) ACI 211.1 (1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete ACI 301 (1996) Standard Specification for Structural Concrete

ACI 305R (1991) Hot Weather Concreting

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 184/A 184M ASTM A 615/A 615M ASTM C 31/C 31M ASTM C 33

ASTM C 39 ASTM C 94 ASTM C 123 ASTM C 143

ASTM C 150 ASTM C 192/C 192M ASTM C 231 ASTM C 260 (1996) Fabricated Deformed Steel Bar Mats
for Concrete Reinforcement (1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
(1998) Making and Curing Concrete Test Specimens in the Field
(1999a) Concrete Aggregates (1996) Compressive Strength of Cylindrical Concrete Specimens
(1997) Ready-Mixed Concrete (1998) Lightweight Particles in Aggregate
(1998) Slump of Hydraulic Cement Concrete (1999a) Portland Cement
(1998) Making and Curing Concrete Test
Specimens in the Laboratory
(1997el) Air Content of Freshly Mixed Concrete by the Pressure Method
(1998) Air-Entraining Admixtures for
Concrete

ASTM C 494 (1999) Chemical Admixtures for Concrete

ASTM C 618 (1999) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete

ASTM C 881 (1999) Epoxy-Resin-Base Bonding Systems for Concrete

ASTM C 1077 (1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM D 1751 (1999) Preformed Expansion Joint Filler
for Concrete Paving and Structural
Construction (Nonextruding and Resilient
Bituminous Types)

ASTM D 1752 (1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
CORPS OF ENGINEERS (COE)

COE CRD-C 130 (1989) Scratch Hardness of Coarse Aggregate Particles

COE CRD-C 300 (1990) Specifications for Membrane-Forming Compounds for Curing Concrete

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100 (1996) Concrete Plant Standards

1.2 SYSTEM DESCRIPTION

This section is intended to stand alone for construction of concrete (rigid) pavement. However, where the construction covered herein interfaces with other sections, the construction at each interface shall conform to the requirements of both this section and the other section, including tolerances for both.

1.3 MEASUREMENT AND PAYMENT

1.3.1 Measurement

The quantity of concrete to be paid for will be the volume of concrete in cubic yards including monolithic curb, where required, placed in the completed and accepted pavement. Concrete will be measured in place in the completed and accepted pavement only within the neat line dimensions shown in the plan and cross section. No deductions will be made for rounded edges or the space occupied by embedded items or voids.

1.3.2 Payment

Payment will be made at the contract price per cubic yard for the scheduled item. Payment shall constitute full compensation for furnishing all materials, equipment, plant, tools, and testing; and for all labor and other incidentals necessary to complete work. No separate payment will be made for any cementitious materials, admixtures, steel reinforcement, dowels or tie bars, or for any joint materials.

1.4 ACCEPTABILITY OF WORK

The pavement will be accepted on the basis of tests made by the Government and by the Contractor or its suppliers, as specified herein. The Government may, at its discretion, make check tests to validate the results of the Contractor's testing. Concrete samples shall be taken by the Contractor at the placement to determine the slump, air content, and strength of the concrete. Test cylinders shall be made for determining conformance with the strength requirements of these specifications and, when required, for determining the time at which pavements may be placed into service. All air content measurements shall be determined in accordance with ASTM C 231. All slump tests shall be made in accordance with ASTM C 143. All test cylinders shall be 6 by 12 inch cylinders and shall be fabricated in accordance with ASTM C 192/C 192M, using only steel molds, cured in accordance with ASTM C 31/C 31M, and tested in accordance with ASTM C 39. A strength

test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. The Contractor shall furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory.

1.4.1 Evaluation Sampling

Sampling, testing, and mixture proportioning shall be performed by a commercial Testing Laboratory, conforming with ASTM C 1077. The individuals who sample and test concrete and concrete constituents shall be certified as American Concrete Institute (ACI) Concrete Field Testing Technicians, Grade I. The individuals who perform the inspection of concrete shall be certified as ACI Concrete Construction Inspector, Level II. All mix design, weekly quality control reports, smoothness reports, and project certification reports shall be signed by a Registered Engineer.

1.4.2 Surface Testing

Surface testing for surface smoothness, edge slump and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Government within 24 hours after measurement is made. A final report of surface testing, signed by a Registered Engineer, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Government upon conclusion of surface testing.

1.4.2.1 Surface Smoothness Requirements

The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified in Table 1 when checked with the straightedge.

TABLE 1

STRAIGHTEDGE SURFACE SMOOTHNESS--PAVEMENTS

Pavement Category	Direction of Testing	Tolerances inches
Runways and Taxiways	Longitudinal Transverse	1/81/4
Calibration Hardstands & Compass Swinging Bases	Longitudinal Transverse	1/81/8
All Other Airfield and Helicopter Paved Areas	Longitudinal Transverse	1/41/4

Roads and Streets	Longitudinal Transverse	3/161/4
Tank Hardstands, Parking Areas, Open Storage Areas	Longitudinal Transverse	1/41/4

1.4.2.2 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

1.4.3 Edge Slump Testing and Conformance

When slip-form paving is used, not more than 15 percent of the total free edge of any 10 inch or thicker slab of the slipformed portion of the pavement, shall have an edge slump exceeding 1/4 inch and no slab shall have an edge slump exceeding 3/8 inch. Edge slump shall be determined as above for surface smoothness, at each free edge of each slipformed paving lane constructed. Measurements shall be made at 5 to 15 foot spacing, and as directed. When edge slump exceeding the limits specified above is encountered on either side of the paving lane, additional straightedge measurements shall be made, if required, to define the linear limits of the excessive slump. The concrete for the entire width of the paving lane within these limits of excessive edge slump shall be removed and replaced. Adding concrete or paste to the edge or otherwise manipulating the plastic concrete after the sliding form has passed, or patching the hardened concrete, shall not be used as a method for correcting excessive edge slump.

1.4.4 Plan Grade Testing and Conformance

The finished surface of the pavements shall conform, within the tolerances shown in Table 1, to the lines, grades, and cross sections shown. The finished surface of new abutting pavements shall coincide at their juncture. The finished surface of airfield runway, taxiway, and apron pavements shall vary not more than 0.04 foot above or below the plan grade line or elevation indicated. The surfaces of other pavements shall vary not more than 0.06 foot above or below the plan grade line or elevation indicated. Each pavement category shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.

1.5 PRECONSTRUCTION TESTING OF MATERIALS

The Contractor shall not be entitled to any additional payment or extension of time because of delays caused by sampling and testing additional sources, or samples, necessitated by failure of any samples. Aggregates shall be sampled and tested by the Test Laboratory and shall be representative of the materials to be used for the project. Test results, signed by a Registered Engineer, shall be submitted 30 days before commencing paving. No aggregate shall be used unless test results show that it meets all requirements of these specifications, including compliance with ASTM C 33 and deleterious materials limitations.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data
Equipment;
Manufacturer's literature on the concrete plant; mixing equipment; hauling equipment; placing and finishing, and curing equipment; at least 7 days prior to start of paving.

Paving;

Paving Schedules at least 7 days prior to start of paving.

Mixture Proportions; G, RE

The report of the Contractor's mixture proportioning studies showing the proportions of all ingredients and supporting information on aggregate and other materials that will be used in the manufacture of concrete, at least 14 days prior to commencing concrete placing operations.

1.7 EQUIPMENT

1.7.1 Batching and Mixing

The batching plant shall conform to NRMCA CPMB 100, the equipment requirements in ASTM C 94, and as specified. Water shall not be weighed or measured cumulatively with another ingredient. All concrete materials batching shall meet ASTM C 94 requirements. Mixers shall be stationary mixers. Truck mixers shall not be used for mixing paving concrete. Batching, mixers, mixing time, permitted reduction of mixing time, and concrete uniformity shall meet the requirements of ASTM C 94, and shall be documented in the initial weekly QC Report. The batching and mixing plant shall be located off Government premises no more than 15 minutes haul time from the placement site. The facility shall provide sufficient batching and mixing equipment capacity to prevent cold joints. The method of measuring materials, batching operation, and mixer shall be submitted for review.

1.7.2 Transporting Equipment

Transporting equipment shall be in conformance with ASTM C 94 and as specified herein. Concrete shall be transported to the paving site in rear-dump trucks, in truck mixers designed with extra large blading and rear opening specifically for low slump concrete, or in agitators. Bottom-dump trucks shall not be used for delivery of concrete.

1.7.3 Delivery Equipment

When concrete transport equipment cannot operate on the paving lane, side-delivery transport equipment consisting of self-propelled moving conveyors shall be used to deliver concrete from the transport equipment and discharge it in front of the paver. Front-end loaders, dozers, or similar equipment shall not be used to distribute the concrete.

1.7.4 Paver-Finisher

The paver-finisher shall be a heavy-duty, self-propelled machine designed specifically for paving and finishing high quality pavement. The paver-finisher shall weigh at least 2200 lb./foot of lane width, and shall be powered by an engine having at least 6.0 horsepower per foot of lane width. The paver-finisher shall spread, consolidate, and shape the plastic concrete to the desired cross section in one pass. The paver-finisher shall be equipped with a full width "knock-down" auger, capable of operating in both directions, which will evenly spread the fresh concrete in front of the screed or extrusion plate. Immersion vibrators shall be gang mounted at the front of the paver on a frame equipped with suitable controls so that all vibrators can be operated at any desired depth within the slab or completely withdrawn from the concrete. The vibrators shall be automatically controlled so that they will be immediately stopped as forward motion of the paver ceases. The spacing of the immersion vibrators across the paving lane shall be as necessary to properly consolidate the concrete, but the clear distance between vibrators shall not exceed 30 inches, and the outside vibrators shall not exceed 12 inches from the edge of the lane. The paver-finisher shall be equipped with a transversely oscillating screed or an extrusion plate to shape, compact, and smooth the surface.

1.7.4.1 Paver-Finisher with Fixed Forms

The paver-finisher shall be equipped with wheels designed to ride the forms, keep it aligned with the forms, and to spread the preventing deformation of the forms.

1.7.4.2 Slipform Paver-Finisher

The slipform paver-finisher shall be automatically controlled and crawler mounted with padded tracks. Horizontal alignment shall be electronically referenced to a taut wire guideline. Vertical alignment

shall be electronically referenced on both sides of the paver to a taut wire guideline, to an approved laser control system, or to a ski operating on a completed lane. Control from a slope-adjustment control or control
operating from the underlying material shall not be used.

Curing Equipment

Equipment for curing is specified in paragraph CURING.

1.7.6 Texturing Equipment

Texturing equipment shall be as specified below.

1.7.6.1 Fabric Drag

A fabric drag shall consist of a piece of fabric material as wide as the lane width securely attached to a separate wheel mounted frame spanning the paving lane or to one of the other similar pieces of equipment. The material shall be wide enough to provide 12 to 18 inches dragging flat on the pavement surface. The fabric material shall be clean, reasonably new burlap, kept clean and saturated during use.

1.7.6.2 Deep Texturing Equipment

Texturing equipment shall consist of a stiff bristled broom, a comb with spring wire tines or spring strips which will produce true, even grooves forming a drag at least 4 feet long. This drag shall be mounted in a wheeled frame spanning the paving lane and constructed to mechanically pull the drag in a straight line across the paving lane perpendicular to the centerline.

1.7.7 Sawing Equipment

Equipment for sawing joints and for other similar sawing of concrete shall be standard diamond-tip-bladed concrete saws mounted on a wheeled chassis.

1.7.8 Straightedge

The Contractor shall furnish and maintain at the job site one 12 foot straightedge for testing concrete surface smoothness. The straightedge shall be constructed of aluminum or magnesium alloy and shall have blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Straightedges shall have handles for operation on the pavement.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious materials shall be portland cement or portland-pozzolan cement and shall conform to appropriate specifications listed below.

2.1.1 Portland Cement Portland cement shall conform to ASTM C 150 Type II, low-alkali.

2.1.2 High-Early-Strength Portland Cement

High-early-strength cement shall conform to ASTM C 150 Type III, with C3A limited to 5 percent, low-alkali.

2.1.3 Pozzolan (Fly Ash))

Fly ash shall conform to ASTM C 618 Class F, including all the supplementary optional physical requirements.

2.2 AGGREGATES

Aggregates shall consist of clean, hard, uncoated particles meeting the requirements of ASTM C 33, including deleterious materials, abrasion loss and soundness requirements of ASTM C 33, and other requirements specified herein.
In addition to the grading requirements specified for coarse aggregate and for fine aggregate, the combined aggregate grading shall meet the following requirements.

a. If necessary, a blending aggregate shall be used to meet the required combined grading. This blending aggregate shall be batched separately. The combined grading of all aggregates used, in the proportions selected, shall be computed on the basis of cumulative percent retained on each sieve specified for fine and coarse aggregate.

b. The materials selected and the proportions used shall be such that when the Coarseness Factor (CF) and the Workability Factor (W) are plotted on a diagram as described in d. below, the point thus determined shall fall within the parallelogram described therein.

c. The Coarseness Factor (CF) shall be determined from the the following equation:

CF = (cumulative percent retained on the 3/8 in. sieve)(100)/(cumulative percent retained on the No. 8 sieve)
The Workability Factor (W) is defined as the cumulative percent passing the No. 8 sieve. However, W shall be adjusted, upwards only, by 2.5 percentage points for each 94 pounds of cementitious material per cubic yard greater than 564 pounds per cubic yard.

d. A diagram shall be plotted using a rectangular scale with W on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this diagram a parallelogram shall be plotted with corners at the following coordinates (CF-75, W-28), (CF-75, W-40), (CF-45, W-32.5), and (CF-45, W-41). If the point determined by the intersection of the computed CF

and W does not fall within the above parallelogram, the grading of each size of aggregate used and the proportions selected shall be changed as necessary.

e. In addition, the individual percent retained on each sieve shall be plotted for the combined aggragate grading, on either rectangular or semi-log graph paper. The graph shall show a relative smooth transition between coarse and fine aggregate and shall have no major valleys or peaks in the area smaller than the No. 8 sieve. If this plot does not meet the above criteria, the grading of each size aggregate used and the proportions selected shall be changed as necessary.

2.2.1 Coarse Aggregate

Coarse aggregate shall consist of crushed gravel, crushed stone, or a combination thereof. Aggregate used for paving compass calibration hardstands shall be free of materials having magnetic properties. Coarse aggregate used for paving power check pads shall be limestone, dolomite, or basalt, or another aggregate if that aggregate has a proven service record demonstrating that it will not cause thermal distress from jet blast. The nominal maximum size of the coarse aggregate shall be 1-1/2 inches. When the nominal maximum size is greater than 1 inch, the aggregates shall be furnished in two ASTM C 33 size groups, No. 67 and No. 4. The amount of deleterious material in each size of coarse aggregate shall not exceed the limits shown in ASTM C 33 Class 1N, 4M or 4S, depending on the weathering region, and the following limits:

a. Lightweight particles 1.0 max. percent by mass (ASTM C 123).

b. Other soft particles 2.0 max. percent by mass (COE CRD-C 130).

c. Total of all deleterious 5.0 max. percent by mass (substances listed in ASTM C 33 and above, exclusive of material finer than No. 200 sieve).

d. The separation medium for lightweight particles shall have a density of Sp. Gr. of 2.0.

2.2.2 Fine Aggregate

Fine aggregate shall consist of natural sand, manufactured sand, or a combination of the two, and shall be composed of clean, hard, durable particles. Aggregate used for paving compass calibration hardstands shall be free of materials having magnetic properties. All fine aggregate shall be composed of clean, hard, durable particles meeting the requirements of ASTM C 33 and the requirements herein. The amount of deleterious material in the fine aggregate shall not exceed the limits in ASTM C 33 and shall not exceed the following limits:

a. Lightweight particles (ASTM C 123) 1.0 percent max. by mass using a medium with a density of Sp. Gr. of 2.0.

b. The total of all deleterious material types, listed in ASTM C 33 and above, shall not exceed 3.0 percent of the mass of the fine aggregate.

2.3 CHEMICAL ADMIXTURES

Air-entraining admixture shall conform to ASTM C 260. An accelerator shall be used only when specified in paragraph SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES and shall not be used to reduce the amount of cementitious material used. Accelerator shall conform to ASTM C 494 Type C. Calcium chloride and admixtures containing calcium chloride shall not be used. A water-reducing or retarding admixture shall meet the requirements of ASTM C
494. Type G or H admixtures are not allowed.

2.4 CURING MATERIALS

Membrane forming curing compound shall be a white pigmented compound conforming to COE CRD-C 300. Burlap shall be new or shall be clean material never used for anything other than curing concrete.

2.5 WATER

Water for mixing and curing shall be clean, potable, and free of injurious amounts of oil, acid, salt, or alkali.

2.6 JOINT MATERIALS

2.6.1 Expansion Joint Material

Expansion joint filler shall be a preformed material conforming to ASTM D 1751 Type I. Expansion joint filler shall be 3/4 inch thick.

2.6.2 Slip Joint Material

Slip joint material shall be 1/4 inch thick expansion joint filler conforming to ASTM D 1751 or ASTM D 1752.

2.7 REINFORCING

2.7.1 General

Reinforcing bars shall conform to ASTM A 615/A 615M, Grade 60. Bar mats shall conform to ASTM A 184/A 184M. Reinforcement shall be free from loose, flaky rust, loose scale, oil, grease, mud, or other coatings that might reduce the bond with concrete.

2.8 DOWELS AND TIE BARS

2.8.1 Dowels

Dowels shall be single piece, plain (non-deformed) steel bars conforming to ASTM A 615/A 615M, Grade 60 or higher. Dowels shall be free of loose, flaky rust and loose scale and shall be clean and straight.

2.8.2 Tie Bars

Tie bars shall be deformed steel bars conforming to ASTM A 615/A 615M, Grade 60. Grade 60 or higher shall not be used for bars that are bent and straightened during construction.

2.9 EPOXY RESIN

All epoxy-resin materials shall be two-component materials conforming to ASTM C 881, Class as appropriate for each application temperature to be encountered; except, that in addition, the materials shall meet the following requirements:

a. Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.

b. Material for use as patching for complete filling of spalls, wide cracks, and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed Portland cement concrete, mortar, or freshly mixed epoxy resin concrete to hardened concrete shall be Type V, Grade as approved.

2.10 SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES

Specified compressive strength, f'c, for concrete is 6,000 psi at 28 days. Maximum allowable water-cementitious material ratio is 0.45. The water-cementitious material ratio is based on absolute volume equivalency, where the ratio is determined using the weight of cement for a cement only mix, or using the total volume of cement plus pozzolan converted to an equivalent weight of cement by the absolute volume equivalency method described in ACI 211.1. The concrete shall be air-entrained with a total air content of 6 plus or minus 1 percent. The maximum allowable slump of the concrete shall be 3 inches for pavement constructed with fixed forms. For slipformed pavement, the maximum allowable slump shall be 1-1/4 inches.
The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

2.11 MIXTURE PROPORTIONS

2.11.1 Composition Concrete

Composition concrete shall be composed of cementitious material, water, fine and coarse aggregates, and admixtures. Fly ash, if used, shall be used only at a rate between 15 and 35 percent by mass of the total cementitious material. Admixtures shall consist of air entraining admixture and may also include accelerator or retarder. High range water-reducing admixtures and admixtures to produce flowable concrete shall not be used. No substitutions shall be made in the materials used

in the mixture proportions without additional tests to show that the quality of the concrete is satisfactory.

2.11.2 Concrete Mixture Proportioning Studies

Trial design batches, mixture proportioning studies, and testing shall be the responsibility of the Contractor, and shall be performed by the Test Laboratory and signed by a Registered Engineer. No concrete pavement shall be placed until the Contracting Officer has approved the Contractor's mixture proportions. All materials used in mixture proportioning studies shall be representative of those proposed for use on the project. If there is a change in materials, additional mixture design studies shall be made using the new materials. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in ACI 211.1. At least three different water-cementitious ratios, which will produce a range of strength encompassing that required on the project, shall be used. Laboratory trial mixtures shall be proportioned for maximum permitted slump and air content. Maximum sand content shall be 40 percent of the total aggregate SSD weight. Aggregate quantities shall be based on the mass in a saturated surface dry condition.

2.11.3 Mixture Proportioning Procedure

The Contractor shall perform the following:

a. Fabricate, cure and test 6 test cylinders per age for each mixture at 7 and 28 days.

b. Using the average strength for each w/(c+p), plot the results from each of the three mixtures on separate graphs for w/(c+p) versus 28-day strength.

c. From the graphs select a w/(c+p) which will produce a mixture giving a 28-day strength equal to the required strength determined in accordance with the following paragraph.

2.11.4 Average Strength Required for Mixtures

In order to ensure meeting, during production, the strength requirements specified, the mixture proportions selected shall produce a required average strength, f'cr, exceeding the specified strength, f'c, in accordance with procedures in Chapter 3 of ACI 301, "Proportioning."

PART 3 EXECUTION

3.1 CONDITIONING OF UNDERLYING MATERIAL

Underlying material, base course or subbase course, upon which concrete is to be placed shall be clean, damp, and free from debris, waste concrete or cement, frost, ice, and standing or running water. After the underlying material has been prepared for concrete placement, no equipment shall be permitted thereon.

3.2 WEATHER LIMITATIONS

3.2.1 Hot Weather Paving

The temperature of concrete shall not exceed 90 degrees F. Steel forms, dowels and reinforcing shall be cooled prior to concrete placement when steel temperatures are greater than 120 degrees F.

3.2.2 Cold Weather Paving

The ambient temperature of the air at the placing site and the temperature of surfaces to receive concrete shall be not less 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F. Materials entering the mixer shall be free from ice, snow, or frozen lumps.
Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Calcium chloride shall not be used at any time. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period. Pavement damaged by freezing shall be completely removed and replaced at the Contractor's expense as specified in paragraph, REPAIR, REMOVAL, AND REPLACEMENT OF SLABS.

3.3 CONCRETE PRODUCTION

3.3.1 General Requirements

Concrete shall be deposited in front of the paver within 45 minutes from the time cement has been charged into the mixing drum, except that if the ambient temperature is above 90 degrees F, the time shall be reduced to 30 minutes. Every load of concrete delivered to the paving site shall be accompanied by a batch ticket from the operator of the batching plant. Tickets shall show at least the mass, or volume, of all ingredients in each
batch delivered, and the time of day. Tickets shall be delivered to the placing foreman who shall keep them on file and deliver them to the Government daily.

3.3.2 Transporting and Transfer-Spreading Operations

Non-agitating equipment shall be used only on smooth roads and for haul time less than 15 minutes. Equipment shall be allowed to operate on the underlying material only if no damage is done to the underlying material and its degree of compaction. Any disturbance to the underlying material that does occur shall be corrected before the paver-finisher reaches the location of the disturbance and the equipment shall be replaced or procedures changed to prevent any future damage.

3.4 PAVING

Pavement shall be constructed with paving and finishing equipment utilizing
fixed forms or slipforms.

3.4.1 Consolidation

The paver vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.

3.4.2 Operation

When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provisions shall be made to prevent damage to the previously constructed pavement, including keeping the existing pavement surface free of any debris, and placing rubber mats beneath the paver tracks. Transversely oscillating screeds and extrusion plates shall overlap the existing pavement the minimum possible, but in no case more than 8 inches.

3.4.3 Required Results

The paver-finisher shall be operated to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. The paver-finishing operation shall produce a surface finish free of irregularities, tears, voids of any kind, and any other discontinuities. It shall produce only a very minimum of paste at the surface. Multiple passes of the paver-finisher shall not be permitted. The equipment and its operation shall produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. No water, other than true fog sprays (mist), shall be applied to the concrete surface during paving and finishing.

3.4.4 Fixed Form Paving

Forms shall be steel, except that wood forms may be used for curves having a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete.

3.4.5 Slipform Paving

The slipform paver shall shape the concrete to the specified and indicated cross section in one pass, and shall finish the surface and edges so that only a very minimum amount of hand finishing is required. Dowels shall not be installed by dowel inserters attached to the paver or by any other means of inserting the dowels into the plastic concrete.

3.4.6 Placing Reinforcing Steel

Reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement, or may be placed on an initial layer of consolidated concrete, with the subsequent layer placed within 30 minutes of the first layer placement.

3.4.7 Placing Dowels and Tie Bars

Dowels shall be installed with alignment not greater than 1/8 inch per ft. Except as otherwise specified below, location of dowels shall be within a horizontal tolerance of plus or minus 5/8 inch and a vertical tolerance of plus or minus 3/16 inch. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement. Dowels and tie bars in joints shall be omitted when the center of the dowel or tie bar is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness.

3.4.7.1 Contraction Joints

Dowels and tie bars in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal basket assemblies. The dowels and tie bars shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from becoming distorted during paving operations. The basket assemblies shall be held securely in the proper location by means of suitable anchors.

3.4.7.2 Construction Joints-Fixed Form Paving

Installation of dowels and tie bars shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.

3.4.7.3 Dowels Installed in Hardened Concrete

Installation shall be by bonding the dowels into holes drilled into the hardened concrete. Holes approximately 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete. Dowels

shall be bonded in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel shall not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic collar fitted around the dowel. The vertical alignment of the dowels shall be checked by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel. Where tie bars are required in longitudinal construction joints of slipform pavement, bent tie bars shall be installed at the paver, in front of the transverse screed or extrusion plate. Tie bars shall not be installed in preformed holes. Before placement of the adjoining paving lane, the tie bars shall be straightened, without spalling the concrete around the bar.

3.4.7.4 Expansion Joints

Dowels in expansion joints shall be installed by the bonded-in-place method or by bonding into holes drilled in hardened concrete, using procedures specified above.

3.5 FINISHING

Clary screeds, "bridge deck" finishers, or other rotating pipe or tube type equipment shall not be permitted. The sequence of machine operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, texturing, and then edging of joints. Hand finishing shall be used only infrequently and only on isolated areas of odd slab shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Equipment to be used for supplemental hand finishing shall primarily be 10 to 12 feet cutting straightedges; only very sparing use of bull floats shall be allowed. At no time shall water be added to the surface of the slab in any way, except for fog (mist) sprays to prevent plastic shrinkage cracking.

3.5.1 Machine Finishing With Fixed Forms

The machine shall be designed to ride the forms. Machines that cause displacement of the forms shall be replaced. The machine shall make only one pass over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, the operation shall be immediately stopped and the equipment, mixture, and procedures adjusted as necessary.

3.5.2 Machine Finishing With Slipform Pavers

If there is sufficient concrete slurry or fluid paste on the surface that it runs over the edge of the pavement, the paving operation shall be immediately stopped and the equipment, mixture, or operation

modified to prevent formation of such slurry. Any slurry which does run down the vertical edges shall be immediately removed. No slurry, concrete or concrete mortar shall be used to build up along the edges of the pavement to compensate for excessive edge slump, either while the concrete is plastic or after it hardens.

3.5.3 Surface Correction

While the concrete is still plastic, irregularities and marks in the pavement surface shall be eliminated by means of cutting straightedges, 10 to 12 feet in length. Depressions shall be filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. Long-handled, flat "bull floats" shall be used sparingly and only as necessary to correct minor, scattered surface defects. Finishing with hand floats and trowels shall be held to the absolute minimum necessary. Joints and edges shall not be overfinished.

3.5.4 Hand Finishing

Hand finishing operations shall be used only for those unusual slabs as specified previously. Grate tampers (jitterbugs) shall not be used. As soon as placed and vibrated, the concrete shall be struck off and screeded. The surface shall be tamped with a strike-off and tamping screed, or vibratory screed. Immediately following the final tamping of the surface, the pavement shall be floated longitudinally. Long-handled, flat bull floats shall be used sparingly and only as necessary to correct surface defects. Finishing with hand floats and trowels shall be held to the absolute minimum necessary. Joints and edges shall not be overfinished. No water shall be added to the pavement during finishing operations.

3.5.5 Texturing

Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described herein. Following initial texturing on the first day of placement, the Placing Foreman, Contracting Officer representative, and a representative of the Using Agency shall inspect the texturing for compliance with design requirements. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris. Any type of transverse texturing shall produce grooves in straight lines across each lane within a tolerance of plus or minus 1/2 inch of a true line. The concrete in areas of recesses for tie-down anchors, lighting fixtures, and other outlets in the pavement shall be finished to provide a surface of the same texture as the surrounding area.

3.5.5.1 Fabric-Drag Surface Finish

Surface texture shall be applied by dragging the surface of the pavement, in the direction of the concrete placement, with a moist fabric drag. The dragging shall produce a uniform finished surface having a fine sandy texture without disfiguring marks.

3.5.5.2 Broom Texturing

Surface texture shall be applied using a mechanical stiff bristle broom drag of a type that will uniformly score the surface transverse to the pavement center line. The broom shall be capable of traversing the full width of the pavement in a single pass at a uniform speed and with a uniform pressure. Successive passes of the broom shall be overlapped the minimum necessary to obtain a uniformly textured surface. The scores should be uniform in appearance and approximately 1/16 inch in depth but not more than 1/8 inch in depth. Hand brooming will be permitted only on isolated odd shaped slabs or slabs where hand finishing is permitted.

3.5.5.3 Wire-Comb Texturing

Surface texture transverse to the pavement center line shall be applied using a mechanical wire comb drag. The comb shall be capable of traversing the full width of the pavement in a single pass at a uniform speed and with a uniform pressure. Successive passes of the comb shall be overlapped the minimum necessary to obtain a continuous and uniformly textured surface. The scores shall be 1/16 to 3/16 inch deep, 1/16 to 1/8 inch wide, and spaced 3/8 inch apart.

3.5.5.4 Surface Grooving

The areas indicated on the drawings shall be grooved with a spring tine drag producing individual grooves 1/4 inch deep and 1/4 inch wide at a spacing between groove centerlines of 2 inches. These grooves shall be cut perpendicular to the centerline. Before grooving begins, the concrete shall be allowed to stiffen sufficiently to prevent dislodging of aggregate. Grooves shall not be cut within 6 inches of a transverse joint or crack.

3.5.6 Edging

The edges of slipformed lanes shall not be edged. After texturing has been completed, the edge of the slabs along the forms shall be carefully finished with an edging tool to form a smooth rounded surface of 1/8 inch radius. No water shall be added to the surface during edging.

3.6 CURING

Concrete shall be continuously protected against loss of moisture and rapid temperature changes for at least 7 days from the completion of finishing operations. Unhardened concrete shall be protected from rain and flowing water. During hot weather with low humidity and/or wind, the Contractor shall institute measures to prevent plastic shrinkage cracks from developing. ACI 305R contains means of predicting plastic shrinkage cracking and preventative measures. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin after the

concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry. Curing shall be accomplished by one of the following methods.

3.6.1 Membrane Curing

A uniform coating of white-pigmented membrane-forming curing compound shall be applied to the entire exposed surface of the concrete including pavement edges as soon as the free water has disappeared from the surface after finishing. If evaporation is high and no moisture is present on the surface even though bleeding has not stopped, fog sprays shall be used to keep the surface moist until setting of the cement occurs. Curing compound shall then be immediately applied. Curing compound shall be applied to the finished surfaces by means of a self-propelled automatic spraying machine, equipped with multiple spraying nozzles with wind shields, spaning the newly paved lane. The curing compound shall be applied at a maximum application rate of 200 square feet per gallon. The application of curing compound by hand-operated, mechanical powered pressure sprayers will be permitted only on odd widths or shapes of slabs where indicated and on concrete surfaces exposed by the removal of forms. The compound shall form a uniform, continuous, cohesive film that will not check, crack, or peel and that will be free from pinholes and other discontinuities. Areas where the curing compound develops the above defects or is damaged by heavy rainfall, sawing or other construction operations within the curing period, shall be immediately resprayed.

3.6.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period, commencing immediately after finishing. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Impervious sheet curing shall not be used.

3.7 JOINTS

No deviation from the jointing pattern shown on the drawings shall be made without written approval of the Contracting Officer. All joints shall be straight, perpendicular to the finished grade of the pavement, and continuous from edge to edge or end to end of the pavement with no abrupt offset and no gradual deviation greater than 1/2 inch.

3.7.1 Longitudinal Construction Joints

Dowels or tie bars shall be installed in the longitudinal construction joints, or the edges shall be thickened as indicated.

3.7.2 Transverse Construction Joints

Transverse construction joints shall be installed at a planned transverse joint, at the end of each day's placing operations and when concrete placement is interrupted. Transverse construction joints shall be constructed either by utilizing headers and hand placement and

finishing techniques, or by placing concrete beyond the transverse construction joint location and then saw cutting full depth and removing concrete back to the transverse construction joint location. For the latter case, dowels shall be installed using methods for dowels installed in hardened concrete described above. All transverse construction joints shall be dowelled.

3.7.3 Expansion Joints

Expansion joints shall be formed where indicated, and about any structures and features that project through or into the pavement, using preformed joint filler of the type, thickness, and width indicated, and shall extend the full slab depth. Edges of the concrete at the joint face shall be edged. The joint filler strips shall be installed to form a recess at the pavement surface to be filled with joint sealant. Expansion joints shall be constructed with dowels and thickened edges for load transfer.

3.7.4 Slip Joints

Slip joints shall be installed the full depth of the slab using expansion joint preformed joint filler material attached to the face of the original concrete placement. A reservoir for joint sealant shall be constructed at the top of the joint. Edges of the joint face shall be edged.

3.7.5 Contraction Joints
Transverse and longitudinal contraction joints shall be of the weakened-plane or dummy type. Longitudinal contraction joints shall be constructed by sawing a groove in the hardened concrete with a power-driven saw. Transverse contraction joints shall be constructed in conformance with requirements for sawed joints.

3.7.5.1 Sawed Joints

Sawed contraction joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the indicated depth. The time of initial sawing shall vary depending on existing and anticipated weather conditions and shall be such as to prevent uncontrolled cracking of the pavement. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting the concrete without chipping, spalling, or tearing. The joints shall be sawed at the required spacing consecutively in the sequence of the concrete placement. Sawing at a given joint location shall be discontinued when a crack develops ahead of the saw cut. Immediately after the joint is sawed, the saw cut and adjacent concrete surface shall be thoroughly flushed with water until all waste from sawing is removed from the joint. The surface shall be resprayed with curing compound as soon as free water disappears. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed with cord or backer rod before the concrete in the region of the joint is resprayed with curing compound.

3.7.6 Thickened Edge Joints

Underlying material in the transition area shall meet the requirements for smoothness and compaction specified for all other areas of the underlying material.

3.8 REPAIR, REMOVAL, AND REPLACEMENT OF SLABS

New pavement slabs that contain full-depth cracks shall be removed and replaced, as specified herein at no cost to the Government. Removal and replacement shall be full depth, shall be full width of the paving lane, and the limit of removal shall be from each original transverse joint. The Contracting Officer will determine whether cracks extend full depth of the pavement and may require minimum 6 inch diameter cores to be drilled on the crack to determine depth of cracking. Cores shall be drilled and the hole later filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin. Drilling of cores and refilling holes shall be at no expense to the Government. Cracks that do not extend full depth of slab shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1. The Contractor shall

ensure that the crack is not widened during epoxy resin injection. Where a full depth crack intersects the original transverse joint, the slab(s) containing the crack shall be removed and replaced, with dowels installed, as required below. Spalls along joints shall be repaired as specified.

3.8.1 Removal and Replacement of Full Slabs

Unless there are keys or dowels present, all edges of the slab shall be sawcut full depth. If keys, dowels, or tie bars are present along any edges, these edges shall be sawed full depth 6 inches from the edge if only keys are present, or just beyond the end of dowels or tie bars if they are present. These joints shall then be carefully sawed on the joint line to within 1 inch of the depth of the dowel or key. The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. The narrow strips along keyed or doweled edges shall be carefully broken up and removed. Care shall be taken to prevent damage to the dowels, tie bars, or keys or to concrete to remain in place. Protruding portions of dowels shall be painted and lightly oiled. The joint face below keys or dowels shall be suitably trimmed so that there is no abrupt offset. If underbreak occurs at any point along any edge, the area shall be hand-filled with concrete, producing an even joint face from top to bottom, before replacing the removed slab. If underbreak over 4 inches deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels, tie bars, or keys on an edge, or where they have been damaged, dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete. Original damaged dowels or tie bars shall be cut off flush with the joint face. All four edges of the new slab shall thus contain dowels or original keys or original tie bars. Prior to placement of new concrete,

the underlying material shall be graded and recompacted, and the surfaces of all four joint faces shall be cleaned of all loose material and contaminants, and coated with a double application of membrane forming curing compound as bond breaker. Placement of concrete shall be as specified for original construction. The resulting joints around the new slab shall be prepared and sealed as specified.

3.8.2 Repairing Spalls Along Joints

Spalls along joints and cracks shall be repaired by first making a vertical saw cut at least 1 inch outside the spalled area and to a depth of at least 2 inches. Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete. The cavity shall be thoroughly cleaned with high pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Prime coat for portland cement repairs shall be a neat cement grout and for epoxy resin repairs shall be epoxy resin, Type III, Grade 1. The cavity shall be filled with low slump portland cement concrete or mortar, or with epoxy resin concrete or mortar. Portland cement concrete shall be used for larger spalls, those more than 1/3 cu. ft. in size after removal operations; portland cement mortar shall be used for spalls between 0.03 and 1/3 cu. ft; and epoxy resin mortar or Type III, Grade 3 epoxy resin for those spalls less than 0.03 cu. ft. in size after removal operations. Portland cement concretes and mortars shall be very low slump mixtures, proportioned, mixed, placed, tamped, and cured. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions, mixing, placing, tamping and curing procedures as recommended by the manufacturer. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints. In lieu of sawing, spalls not adjacent to joints, and popouts, both less than 6 inches in maximum dimension, may be prepared by drilling a core 2 inches in diameter greater than the size of the defect, centered over the defect, and 2 inches deep or 1/2 inch into sound concrete, whichever is greater. The core hole shall be repaired as specified above for other spalls.

3.8.3 Areas Defective in Plan Grade or Smoothness

In areas not meeting the specified limits for surface smoothness and plan grade, high areas shall be reduced to attain the required smoothness and grade, except as depth is limited below. High areas shall be reduced by grinding the hardened concrete with a surface grinding machine after the concrete is 14 days or more old. The depth of grinding shall not exceed 1/4 inch. All pavement areas requiring plan grade or surface smoothness corrections in excess of the specified

limits, shall be removed and replaced. In pavement areas given a wire comb or tined texture, areas exceeding 25 square feet that have been corrected by rubbing or grinding shall be retextured by grooving machine sawn grooves meeting the requirements for the wire comb or tined texture. All areas in which grinding has been performed will be subject to the thickness tolerances specified in paragraph Thickness. Any grinding performed on individual slabs with excessive deficiencies shall be performed at the Contractor's own decision without entitlement to additional compensation if eventual removal of the slab is required.

3.9 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

Existing concrete pavement shall be removed as indicated and as specified in Section 02220 DEMOLITION modified, and expanded as specified herein. Removal, repair and replacement shall be made as indicated and as specified in paragraph REPAIR, REMOVAL, AND REPLACEMENT OR SLABS.

3.10 PAVEMENT PROTECTION

The Contractor shall protect the pavement against all damage prior to final acceptance of the work. Traffic shall be excluded from the new pavement. As a construction expedient in paving intermediate lanes between newly paved pilot lanes, operation of the hauling equipment will be permitted on the new pavement after the pavement has been cured for 7 days and the joints have been sealed or otherwise protected. All new and existing pavement carrying construction traffic or equipment shall be continuously kept completely clean. Special cleaning and care shall be used where Contractor's traffic uses or crosses active airfield pavement.

3.11 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL (CQC)

Paragraph ACCEPTABILITY OF WORK contains additional CQC requirements. The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and submit reports as specified. When, in the opinion of the Contracting Officer, the paving operation is out of control, concrete placement shall cease.

3.11.1 Batch Plant Control

A daily report shall be prepared indicating checks made for scale accuracy with test weights, checks of batching accuracy, and corrective action taken prior to and during placement for weighing or batching, type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water masses per cubic yd, amount of water as free moisture in each size of aggregate, and the batch aggregate and water masses per cubic yd. for each class of concrete batched during each day's plant operation.

3.11.2 Concrete Mixture

a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two other tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of paving. Whenever air content reaches specified limits, an immediate confirmatory test shall be made. If the second test also shows air content at or exceeding specified limits, an adjustment shall immediately be made in the amount of air-entraining admixture batched to bring air content within specified limits. If the next adjusted batch of concrete is not within specified limits, concrete placement shall be halted until concrete air content is within specified limits.

b. Slump Testing. ASTM C 143. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided the water to cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 10 cubic yards (maximum) of concrete.

c. Temperature. The temperature of the concrete shall be measured when strength specimens are fabricated.

d. Concrete Strength Testing. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests of each mix design of concrete placed each day shall be taken not less than once a shift, nor less than once for each 100 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. Control charts for strength showing the 7-day and 28-day compressive strengths and the 28-day required compressive strength shall be maintained and submitted with Daily CQC Reports.

3.11.3 Inspection Before Placing

Underlying materials, joint locations and types, construction joint faces, forms, reinforcing, dowels, and embedded items shall be inspected by a Registered Engineer in sufficient time prior to each paving operation in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing, and the certification signed by the Registered Engineer, prior to each days' paving.

3.11.4 Paving Operations

The placing foreman shall supervise all placing and paving operations, shall determine that the correct quality of concrete is placed in each location as shown, shall insure that the concrete is consolidated full depth and that finishing is performed as specified. The placing foreman shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume of concrete placed, and method of paving and any problems encountered.

3.11.5 Curing Inspection

a. Moist Curing Inspections. Each day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded. When any inspection finds an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for the area shall be extended by 1 day.

b. Membrane Curing Inspection. At the end of each day's placement, the CQC Representative shall determine the quantity of compound used by measurement of the container; shall determine the area of concrete surface covered; shall then compute the rate of coverage in square feet per gallon and shall also note whether or not coverage is uniform. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

3.11.6 Cold-Weather Protection

At least once per day, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.11.7 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report, signed by a Registered Engineer, shall be prepared for the updating of control charts and test data, and all CQC inspections and actions covering the entire period from the start of the construction through the current week. Reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all CQC records. A copy of weekly reports shall be faxed to the Cpntracting Officer. At the completion of concrete placement, a certification report shall be prepared containing mix designs, all updated control charts and concrete test data, quality control reports, smoothness reports, and other pertinent data on the concrete, with a certification by a Registered Engineer that the concrete placed meets all specification requirements. A copy of the certification report shall be mailed to the Contracting Officer.

-- End of Section -

SECTION 02761N

PAVEMENT MARKINGS
01/06

PART 1 GENERAL

1.1 REFERENCES

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.

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325	(Rev C) Beads (Glass Spheres) Retro-Reflective (Metric)
FS TT-P-1952	(Rev D; Notice 1) Paint, Traffic and Airfield Marking, Waterborne (Metric)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Reflective media for airfields

Paints for airfields

Equipment; G

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation.

Qualifications

Documentation on personnel qualifications, as specified.

SD-06 Test Reports

Reflective media for airfields

Paints for airfields

SD-07 Certificates

Reflective media for airfields

Paints for airfields

Volatile Organic Compound (VOC)

Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

Construction equipment list

SD-08 Manufacturer's Instructions

Paints for airfields

Submit manufacturer's Material Safety Data Sheets.

1.3 DELIVERY AND STORAGE

Deliver paints, paint materials and thermoplastic compound materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer. Provide storage facilities at the job site for maintaining materials at temperatures recommended by the manufacturer. Make available paint stored at the project site or segregated at the source for sampling not less than 30 days prior to date of required approval for use to allow sufficient time for testing. Notify the Contracting Officer when paint is available for sampling.

1.4 WEATHER LIMITATIONS

Apply paint to clean, dry surfaces, and unless otherwise approved, only when the air and pavement surface temperature is at least 5 degrees above the dew point and the air and pavement temperatures are above 40 degrees F and less than 95 degrees F for oil-based materials; above 50 degrees F and less than 110 degrees F for water-based materials. Maintain paint temperature within these same limits.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work shall be approved by the Contracting Officer and maintained in satisfactory operating condition. Submit construction equipment list for approval by the Contracting Officer.

1.5.1 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.

1.5.2 Paint Application Equipment

1.5.2.1 Self-Propelled or Mobile-Drawn Pneumatic Spraying Machines

The equipment for applying the paint for airfield pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a width of line at any one time in multiples of 4 inches, from 4 inches to 3 feet at a speed of at least 5 miles per hour. Provide paint applicator with paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with requirements specified. Equip tanks with suitable air-driven mechanical agitators. Equip spray mechanism with quick-action valves conveniently located, and include necessary pressure regulators and gages in full view and reach of the operator. Install paint strainers in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Provide pneumatic spray guns for hand application of paint in areas where the mobile paint applicator cannot be used. Applicator for water-based markings shall be equipped with non-stick coated hoses; metal parts in contact with the paint material shall be constructed of grade 302, 304, 316, or equal stainless steel.

1.5.3 Thermoplastic Application Equipment

1.5.3.1 Thermoplastic Material

Thermoplastic material shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe.

1.5.3.2 Application Equipment

a. Application equipment shall provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the extrusion shoe or spray gun shall prevent accumulation and clogging. All parts of the equipment which come into contact with the material shall be easily accessible and exposable for cleaning and maintenance. All mixing and conveying parts up to and including the extrusion shoes and spray guns shall maintain the material at the required temperature with heat-transfer oil or electrical-element-controlled heat.

b. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skiplines". The equipment shall be capable of applying varying widths of traffic markings.

c. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.

1.5.3.3 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of two general types: mobile applicator and portable applicator.

1.5.3.4 Mobile Application Equipment

The mobile applicator shall be defined as a truck-mounted, self-contained pavement marking machine that is capable of hot applying thermoplastic by either the extrusion or spray method. The unit shall be equipped to apply the thermoplastic marking material at temperatures exceeding 375 degrees F, at widths varying from 3 to 12 inches and in thicknesses varying from 0.040 to 0.200 inch and shall have an automatic drop-on bead system. The mobile unit shall be capable of operating continuously and of installing a minimum of 20,000 lineal feet of longitudinal markings in an 8-hour day.

The mobile unit shall be equipped with a melting kettle which holds a minimum of 6000 pounds of molten thermoplastic material. The kettle shall be capable of heating the thermoplastic composition to temperatures of 375 to 425 degrees F. A thermostatically controlled heat transfer liquid shall be used. Heating of the composition by direct flame shall not be allowed. Oil and material temperature gauges shall be visible at both ends of the kettle.

The mobile unit shall be equipped with an electronic programmable line pattern control system. The control system shall be capable of applying skip or solid lines in any sequence, through any and all of the extrusion shoes, or the spray guns, and in programmable cycle lengths. In addition, the mobile unit shall be equipped with an automatic counting mechanism capable of recording the number of lineal feet of thermoplastic markings applied to the pavement surface with an accuracy of 0.5 percent.

1.5.3.5 Portable Application Equipment

The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stopbars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. The portable applicator shall be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. The portable applicator shall be equipped with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 375 to 425 degrees F, of extruding a line of 3 to 12 inches in width, and in thickness of not less than

0.120 inch nor more than 0.190 inch and of generally uniform cross section.

1.5.4 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION, at all operating speeds of the applicator to which it is attached.

1.5.5 Preformed Tape Application Equipment

Mechanical application equipment shall be used for the placement of preformed marking tape. Mechanical application equipment shall be defined as a mobile pavement marking machine specifically designed for use in applying precoated, pressure-sensitive pavement marking tape of varying widths, up to 12 inches. The applicator shall be equipped with rollers, or other suitable compactive device, to provide initial adhesion of the preformed, pressure-sensitive marking tape with the pavement surface. Additional hand-operated rollers shall be used as required to properly seat the thermoplastic tape.

1.5.6 Surface Preparation Equipment

1.5.6.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cfm of air at a pressure of not less than 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water. Pay Special attention as to what process is used to remove paint, as to not abrade the existing PCC surface.

1.5.6.2 Waterblast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.5.7 Marking Removal Equipment

Equipment shall be mounted on rubber tires and shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Waterblasting equipment shall be capable of producing an adjustable, pressurized stream of water. Sandblasting equipment shall include an air compressor, hoses, and nozzles. The compressor shall be equipped with traps to maintain the air free of oil and water.

1.5.7.1 Shotblasting Equipment

Shotblasting equipment shall be capable of producing an adjustable depth of removal of marking and pavement. Each unit shall be self-

cleaning and self-contained, shall be able to confine dust and debris from the operation, and shall be capable of recycling the abrasive for reuse.

1.5.7.2 Chemical Equipment

Chemical equipment shall be capable of application and removal of chemicals from the pavement surface, and shall leave only non-toxic biodegradeable residue.

1.5.8 Traffic Controls

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.6 WEATHER LIMITATIONS FOR REMOVAL

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

1.7 QUALIFICATIONS

The Contractor shall submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials conforming to the requirements specified herein.

2.1.1 Paints for Airfields

FS TT-P-1952, color as indicated.

2.1.2 Reflective Media for Airfields

FS TT-B-1325, Type I, Gradation A.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Allow new pavement surfaces to cure for a period of not less than 30 days before application of marking materials. Thoroughly clean

surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Remove residual curing compounds, and other coatings adhering to the pavement by water blasting. Shot blasting shall not be used on airfield pavements due to the potential of Foreign Object Damage (FOD) to aircraft. Scrub affected areas, where oil or grease is present on old pavements to be marked, with several applications of trisodium phosphate solution or other approved detergent or degreaser and rinse thoroughly after each application. After cleaning oil-soaked areas, seal with shellac or primer recommended by the manufacturer to prevent bleeding through the new paint. Do not commence painting in any area until pavement surfaces are dry and clean.

3.1.1 Early Painting of Rigid Pavements

Pretreat rigid pavements that require early painting with an aqueous solution containing 3 percent phosphoric acid and 2 percent zinc chloride. Apply the solution to the areas to be marked.

3.1.2 Early Painting of Asphalt Pavements

For asphalt pavement systems requiring painting application at less than 30 days, apply the paint and beads at half the normal application rate, followed by a second application at the normal rate after 30 days.

3.2 APPLICATION

3.2.1 Testing for Moisture

Apply pavement markings to dry pavement only. The Contractor shall test the pavement surface for moisture before beginning work after each period of rainfall, fog, high humidity, or cleaning, or when the ambient temperature has fallen below the dew point. Do not commence marking until the pavement is sufficiently dry and the pavement condition has been approved by the CO or authorized representative. Employ the "plastic wrap method" to test the pavement for moisture as follows: Cover the pavement with a 300 mm by 300 mm (12 inch by 12 inch) section of clear plastic wrap and seal the edges with tape. After 15 minutes, examine the plastic wrap for any visible moisture accumulation inside the plastic. Do not begin marking operations until the test can be performed with no visible moisture accumulation inside the plastic wrap.

3.2.2 Rate of Application

3.2.2.1 Reflective Markings

Apply paint evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet per gallon. Apply glass spheres uniformly to the wet paint on airfield pavement at a rate of (10) plus or minus (0.5) pounds of glass spheres per gallon. Collect and record readings for white and yellow retroreflective markings at the rate of one reading per 1000 linear feet. The minimum acceptable average for white markings is 200 millicandelas per square meter per lux

(mcd/m2/lx) (measured with Mirolux 12 Retroreflectometer or similar instrument as agreed). The minimum acceptable average for yellow markings is 175 millicandelas per square meter per lux (mcd/m2/lx). Readings shall be computed by averaging a minimum of 10 readings taken within the area at random locations. Areas not meeting the retroreflective requirements stated above shall be re-marked.

3.2.2.2 Nonreflective Markings

Apply paint evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet per gallon.

3.2.3 Painting

Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

3.2.4 Reflective Media

Application of reflective media shall immediately follow the application of paint. Accomplish drop-on application of the glass spheres to ensure even distribution at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, discontinue operations until deficiency is corrected.

3.3 FIELD TESTING, INSPECTION, AND DEMONSTRATIONS

3.3.1 Sampling and Testing

As soon as the paint and reflective materials are available for sampling, obtain by random selection from the sealed containers, two quart samples of each batch in the presence of the Contracting Officer. Accomplish adequate mixing prior to sampling to ensure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved. At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.

3.3.2 Inspection

Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance. A certificate of compliance shall be accompanied by test results substantiating conformance to the specified requirements.

3.3.3 Surface Preparations and Application Procedures

Surface preparations and application procedures will be examined by the Contracting Officer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

3.3.3.1 Test Stripe Demonstration

Prior to paint application, demonstrate test stripe application within the work area using the proposed materials and equipment. Apply separate test stripes in each of the line widths and configurations required herein using the proposed equipment. The test stripes shall be long enough to determine the proper speed and operating pressures for the vehicle(s) and machinery, but not less than 50 feet long.

3.3.3.2 Application Rate Demonstration

During the Test Stripe Demonstration, demonstrate compliance with the application rates specified herein. Document the equipment speed and operating pressures required to meet the specified rates in each configuration of the equipment and provide a copy of the documentation to the Contracting Officer or authorized representative prior to proceeding with the work.

3.3.3.3 Retroreflective Value Demonstration

After the test stripes have cured to a "no-track" condition, demonstrate compliance with the average retroreflective values specified herein. Take a minimum of ten readings on each test stripe with a Mirolux 12 Retroreflectometer, or similar instrument with the same measuring geometry and direct readout in millicandelas per square meter per lux (mcd/m2/lx).

3.3.3.4 Level of Performance Demonstration

The Contracting Officer or authorized representative will be present the application demonstrations to observe the results obtained and to validate the operating parameters of the vehicle(s) and equipment. If accepted by the Contracting Officer or authorized representative, the test stripe shall be the measure of performance required for this project. Work shall not proceed until the demonstration results are satisfactory to the Contracting Officer or authorized representative.

3.4 TRAFFIC CONTROL AND PROTECTION

Place warning signs near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Place small markers along newly painted lines to control traffic and prevent damage to newly painted surfaces. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

3.5 QUALITY ASSURANCE

Demonstrate success of bond of reflective media, new paint marking and the pavement surface, vacuum cured surface of new marking after a seven (7) day dry time. Inspect newly applied markings for signs of bond failure based on visual inspection and comparison to results from Test Stripe Demonstration paragraph.

3.5.1 Reflective Media and Coating Bond Verification

Within seven (7) days after pavement marking application, use industrial vacuum to sweep new markings. Visually inspect the pavement markings and the material captured by the vacuum. Verify that no significant loss of reflective media has occured to the pavement marking due to the vacuum cleaning.

3.5.2 Reflective Media and Coating Application Verification

Use a wet film thickness guage to masure the application of wet paint.

Use a microscope or magnifying glass to evaluate the embedment of glass beads in the paint. Verify the glass bead embedment with approximately 50% of the beads embedded and 50% of the beads exposed.

-- End of Section --

SECTION 02762

COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS
07/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 2628	(1991; R 1998) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D 2835	(1989; R 2003) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

1.2 SAFETY

Compression joint seals shall not be placed within 25 feet of liquid oxygen (LOX) equipment, LOX storage, or LOX piping.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment

List of proposed equipment to be used in the performance of construction work, including descriptive data, 20 days prior to use on the project.

Manufacturer's Instructions

Where installation procedures are required in accordance with the manufacturer's recommendations, printed copies of manufacturers' instructions, 20 days prior to use on the project.

SD-04, Samples

Compression Seals; G

Regardless of testing responsibility, 9 foot long samples of the materials, 60 days prior to use on the project. Printed directions from the manufacturer on recommended installation criteria shall be furnished with the samples plus the manufacturer's certification that the selected seal is recommended for the installation on this project.

SD-06 Test Reports

Test Requirements

Certified copies of test results, 20 days prior to use of material on the project.

1.4 TEST REQUIREMENTS

Each lot of compression joint seal and lubricant/adhesive shall be sampled, identified, and tested for conformance with the applicable material specification. A lot of compression seal shall consist of 1 day's production or 20,000 linear feet for each cross section, whichever is less. A lot of lubricant/adhesive shall consist of 1 day's production. Testing of the compression joint seal and lubricant/adhesive material shall be the responsibility of the Contractor and shall be performed in an approved independent laboratory, and certified copies of the test reports shall be submitted for approval 20 days prior to the use of the materials at the jobsite. Samples of each lot of material shall also be submitted and will be retained by the Government for possible future testing should the materials appear defective during or after application. The Contractor shall furnish additional samples of materials, in sufficient quantity to be tested, upon request. Final acceptance will be based on conformance to the specified test requirements and the performance of the in-place materials.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.5.1 Joint Cleaning Equipment

1.5.1.1 Concrete Saw

A self-propelled power saw with water-cooled diamond saw blades shall be provided for cutting joints to the depths and widths specified and for removing filler, existing old joint seal, or other material embedded in the joints or adhered to the joint faces.

1.5.1.2 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hose, and a long-wearing venturi-type nozzle of proper size, shape, and opening. The maximum nozzle opening should not exceed 1/4 inch. The air compressor shall be portable and shall be capable of furnishing not less than 150 cubic feet per minute and maintaining a line pressure of not less than 90 psi at the nozzle while in use. The compressor shall

be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint about 1 inch above the pavement surface and will direct the blast to clean the joint walls. The height, angle of inclination, and the size of the nozzle shall be adjusted as necessary to ensure satisfactory results.

1.5.1.3 Waterblasting Equipment

Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, a wand with safety release cutoff controls, nozzle, and auxiliary water resupply equipment. The water tank and auxiliary water resupply equipment shall be of sufficient capacity to permit continuous operations. The pumps, hoses, wand, and nozzle shall be of sufficient capacity to permit the cleaning of both walls of the joint and the pavement surface for a width of at least 1/2 inch on either side of the joint. A pressure gauge mounted at the pump shall show at all times the pressure in psi at which the equipment is operating.

1.5.2 Sealing Equipment

Equipment used to install the compression seal shall place the compression seal to the prescribed depths within the specified tolerances without cutting, nicking, twisting, or otherwise damaging the seal. The equipment shall be capable of placing the seal with not more than two percent longitudinal stretch or compression of the seal during installation. The machine shall be an automatic self-propelled joint seal application equipment and engine powered. The machine shall include a reservoir for the lubricant/adhesive, a device for conveying the lubricant/adhesive in the proper quantities to the sides of the compression seal or the sidewalls of the joints, a reel capable of holding one full spool of compression seal, and a power-driven apparatus for feeding the joint seal through a compression device and inserting the seal into the joint. The equipment shall also include a guide to maintain the proper course along the joint being sealed. The machine shall at all times be operated by an experienced operator.

1.6 TRIAL JOINT SEAL AND LUBRICANT/ADHESIVE INSTALLATION

Prior to the cleaning and sealing of the joints for the entire project, a test section at least 200 feet long shall be prepared at a designated location in the project pavement, using the specified materials and the approved equipment to demonstrate the proposed joint preparation and sealing of all types of joints in the project. Following the completion of the trial length and before any other joint is sealed, the trial joints will be inspected by the Government to determine that the materials and installation meet the requirements specified. If materials or installation do not meet requirements, the materials shall be removed, and the joints shall be recleaned and resealed at no cost to the Government. No other joints shall be sealed until the test installation has been approved. If the trial section is approved, it may be incorporated into the permanent work. Other joints shall be sealed in the manner approved for sealing the trial joint.

1.7 DELIVERY AND STORAGE

Materials delivered to the jobsite shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall protect materials from weather and shall maintain materials at temperatures recommended by the manufacturer.

1.8 ENVIRONMENTAL CONDITIONS

The ambient temperature and the pavement temperature within the joint wall shall be at least 35 degrees F and rising at the time of installation of the materials. Sealant installation will not be allowed if moisture or foreign material is observed in the joint.

PART 2 PRODUCTS

2.1 COMPRESSION SEALS

Compression joint seal materials shall be a vulcanized elastomeric compound using polychloroprene as the only base polymer. The material and manufactured seal shall conform to ASTM D 2628. The joint seal shall be a labyrinth type seal. The uncompressed depth of the face of the compression seal (that is to be bonded to the joint wall) shall be greater than the uncompressed width of the seal, except that for seals 1 inch or greater in width, the depth need be only 1 inch or greater. The actual width of the uncompressed seal for construction and contraction joints will be at the option of the Contractor. The tolerance on the seal shall be plus 1/8 inch or minus 1/16 inch.

2.2 LUBRICANT/ADHESIVE

Lubricant/adhesive used for the compression elastomeric joint seal shall be a one-component compound conforming to ASTM D 2835.

PART 3 EXECUTION

3.1 PREPARATION OF JOINTS

Immediately before installation of the compression joint seal, the joints shall be thoroughly cleaned to remove laitance, filler, existing sealer, foreign material and protrusions of hardened concrete from the sides and upper edges of the joint space to be sealed. Cleaning shall be by sandblasting or waterblasting and shall extend along pavement surfaces at least 1/2 inch on either side of the joint. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water. The Contractor shall demonstrate that the selected cleaning operation meets the cleanliness requirements. Any irregularity in the joint face which would prevent uniform contact between the joint seal and the joint face shall be corrected prior to the installation of the joint seal.

3.1.1 Sawing

Joints shall be cleaned and opened to the specified width and depth by sawing. Immediately following the sawing operation, the joint faces and opening shall be thoroughly cleaned using a water jet to remove

saw cuttings or debris remaining on the faces or in the joint opening. Compression seal shall be installed within 3 calendar days of the time the joint cavity is sawed. Depth of the joint cavity shall be per manufacturer's instructions. The saw cut for the joint seal cavity shall be centered over the joint line. The nominal width of the sawed joint seal cavity shall be as follows; the actual width shall be within a tolerance of plus or minus 1/16 inch:

a. If a nominal 13/16 inch wide compression seal is furnished, the nominal width of the saw cut shall be 8/16 inches when the pavement temperature at the time of sawing is between 50 and 115 degrees F. If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1/16 inch. If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 inch.

b. If a nominal 1 inch wide compression seal is furnished, the nominal width of the saw cut shall be 9/16 inches when the pavement temperature at the time of sawing is between 55 and 180 degrees F. If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1/16 inch. If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 inch.

c. The pavement temperature shall be measured in the presence of the Contracting Officer. Measurement shall be made each day before commencing sawing and at any other time during the day when the temperature appears to be varying from the allowable sawing range.

3.1.2 Sandblast Cleaning

A multiple pass sandblasting technique shall be used until the surfaces are free of dust, dirt, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete.

3.1.3 Waterblast Cleaning

A multiple pass waterblast technique shall be used until the surfaces are free of dust, dirt, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete.

3.1.4 Rate of Progress

Sandblasting or waterblasting of joint faces shall be limited to the length of joint that can be sealed during the same workday.

3.2 INSTALLATION OF THE COMPRESSION SEAL

3.2.1 Time of Installation

Joints shall be sealed immediately within 3 calendar days of sawing the joint seal cavity and following concrete cure and the final

cleaning of the joint walls. Open joints ready for sealing that cannot be sealed under the specified conditions shall be provided with an approved temporary seal to prevent infiltration of foreign material. When rain interrupts the sealing operations, the joints shall be washed, air pressure cleaned, and allowed to dry prior to installing the lubricant/adhesive and compression seal.

3.2.2 Sequence of Installation

Longitudinal joints shall be sealed first, followed by transverse joints. Seals in longitudinal joints shall be installed so that all transverse joint seals will be intact from edge to edge of the pavement. Intersections shall be made monolithic by use of joint seal adhesive and care in fitting the intersection parts together. Extender pieces of seal shall not be used at intersections. Any seal falling short at the intersection shall be removed and replaced with new seal at no additional cost to the Government. Seals that are required to change direction by more than 20 degrees, may require a poured sealant at the intersection. Poured sealant shall be per compression seal manufacturer's instructions.

3.3 SEALING OF JOINTS

The sides of the joint seal or the sides of the joint shall be covered with a coating of lubricant/adhesive and the seal installed as specified. Butt joints and seal intersections shall be coated with liberal applications of lubricant/adhesive. Lubricant/adhesive spilled on the pavement shall be removed immediately to prevent setting on the pavement. The in-place joint seal shall be in an upright position and free from twisting, distortion, and cuts. Adjustments shall be made to the installation equipment and procedure, if the stretch exceeds 1 percent. Any seal exceeding 2 percent stretch shall be removed and replaced. The joint seal shall be placed at a uniform depth within the tolerances specified. In-place joint seal which fails to meet the specified requirements shall be removed and replaced with new joint seal at no cost to the Government. The compression joint seal shall be placed to a depth of 1/4 inch, plus or minus 1/8 inch, below the pavement surface except when the joint is beveled or has a radius at the surface, or unless otherwise directed. For beveled joints or joints with a radius at the surface, the compression joint seal shall be installed at a depth of 1/8 inch, plus or minus 1/8 inch, below the bottom of the edge of the bevel or radius. No part of the seal shall be allowed to project above the surface of the pavement or above the edge of the bevel or radius. The seal shall be installed in the longest practicable lengths in longitudinal joints and shall be cut at the joint intersections to provide continuous installation of the seal in the transverse joints. The lubricant/adhesive in the longitudinal joints shall be allowed to set for 1 hour prior to cutting at the joint intersections to reduce the possibility of shrinkage. For all transverse joints, the minimum length of the compression joint seal shall be the pavement width from edge to edge.

3.4 CLEAN-UP

Upon completion of the project, all unused materials shall be removed from the site, any lubricant/adhesive on the pavement surface shall be removed, and the pavement shall be left in clean condition.

3.5 QUALITY CONTROL PROVISIONS

3.5.1 Application Equipment

The application equipment shall be inspected to assure uniform application of lubricant/adhesive to the sides of the compression joint seal or the walls of the joint. If any equipment causes cutting, twisting, nicking, excessive stretching or compressing of the seal, or improper application of the lubricant/adhesive, the operation shall be suspended until causes of the deficiencies are determined and corrected.

3.5.2 Procedures

3.5.2.1 Quality Control Inspection

Quality control provisions shall be provided during the joint cleaning process to prevent or correct improper equipment and cleaning techniques that damage the concrete in any manner. Cleaned joints shall be approved by the Government prior to installation of the lubricant/adhesive and compression joint seal.

3.5.2.2 Conformance to Stretching and compression Limitations

Conformance to stretching and compression limitations shall be determined. The top surface of the compression seal shall be marked at 1 foot intervals in a manner clear and durable to enable length determinations of the seal. After installation, the distance between the marks shall be measured on the seal. If the stretching or compression exceeds 2 percent, the seal shall be removed and replaced with new joint at no additional cost to the Government. The seal shall be removed up to the last correct measurement. The seal shall be inspected a minimum of once per 400 feet of seal for compliance to the shrinkage or compression requirements. Measurements shall also be made at the same interval to determine conformance with depth and width of installation requirements. Compression seal that is not in conformance with specification requirements shall be removed and replaced with new joint seal at no additional cost to the Government.

3.5.2.3 Pavement Temperature

The pavement temperature shall be determined by placing a thermometer in the initial saw cut for the joint and the reading shall be recorded. The thermometer shall remain in the joint for an adequate time to provide a control reading.

3.5.3 Final Inspection

The joint sealing system (compression seal and lubricant/adhesive) shall be inspected for proper rate of cure and bonding to the concrete, cuts, twists, nicks and other deficiencies. Seals exhibiting any defects, at any time prior to final acceptance of the

project, shall be removed from the joint, wasted, and replaced in a satisfactory manner.

-- End of Section --

SECTION 03300N

CAST-IN-PLACE CONCRETE
02/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117	(1990; R 2002) Standard Tolerances for Concrete Construction and Materials & Commentary
ACI 211.1	(1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(1999) Specifications for Structural Concrete for Buildings
ACI 302.1R	(2004) Guide for Concrete Floor and Slab Construction
ACI 304R	(2000) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 318/318R	(2005) Building Code Requirements for Structural Concrete and Commentary
ACI 318M/318RM	(2002) Metric Building Code Requirements for Structural Concrete and Commentary
ACI 347R	(2003) Guide to Formwork for Concrete
ACI SP-66	(2004) ACI Detailing Manual

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 2000) Burlap Cloth Made from Jute or Kenaf

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995) Basic Hardboard

ASTM INTERNATIONAL (ASTM)

ASTM A 496	(2002) Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 615/A 615M	(2004b) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 616/A 616M	(1996a) Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 617/A 617M	(1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 82	(2002) Steel Wire, Plain, for Concrete Reinforcement
ASTM C 1017/C 1017M	(2003) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1107	(2002) Packaged Dry, Hydraulic-Cement Grout(Nonshrink)
ASTM C 143/C 143M	(2003) Slump of Hydraulic Cement Concrete
ASTM C 150	(2005) Portland Cement
ASTM C 171	(2003) Sheet Materials for Curing Concrete
ASTM C 172	(2004) Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2001e1) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(2002) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 227	(2003) Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C 231	(2004) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 295	(2003) Petrographic Examination of Aggregates for Concrete
ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2003a) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Concrete Aggregates

ASTM C 39	(1993a) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42/C 42M	(2004) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 494/C 494M	(2004) Chemical Admixtures for Concrete
ASTM C 59/C 59M5	(2000; Rev A) Blended Hydraulic Cements
ASTM C 618	(2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM C 94/C 94M	(2004a) Ready-Mixed Concrete
ASTM C 989	(2004) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM D 1190	(1997) Concrete Joint Sealer, Hot-Applied Elastic Type
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1854	(2002) Jet-Fuel-Resistant Concrete Joint Sealer, Hot-Applied Elastic Type

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 572	(1974) Specifications for Polyvinylchloride Waterstops

U.S. DEPARTMENT OF COMMERCE (DOC)

PS1	(1995) Construction and Industrial Plywood (APA V995)

1.2 DEFINITIONS

a. "Cementitious material" as used herein shall include all portland cement, pozzolan, fly ash, and ground iron blast-furnace slag.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Concrete Pavement for Airfields" means concrete used to construct the PCC pavement and shall conform to Section 02753 CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS MORE THAN 10,000 CUBIC YARDS This section shall not apply to "Concrete Pavement for Airfields".

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcing steel; G

Reproductions of contract drawings are unacceptable.

SD-03 Product Data

Materials for curing concrete

Joint sealants

Joint filler

Epoxy bonding compound

Waterstops

SD-05 Design Data

Concrete mix design; G

Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, silica fume, ground slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregate

changes. In addition, copies of the fly ash, silica fume, and pozzolan test results shall be submitted. The approval of fly ash, silica fume, and pozzolan test results shall have been within 6 months of submittal date. Obtain acknowledgement of receipt prior to concrete placement.

SD-06 Test Reports

Concrete mix design; G

Fly ash

Pozzolan

Ground iron blast-furnace slag

Aggregates

Compressive strength tests

Ion concentration

Air Content

SD-07 Certificates

Curing concrete elements

Pumping concrete

Form removal schedule

Biodegradable Form Release Agent

Material Safety Data Sheets

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had been substituted for the words "should" or "could" or "may," wherever they appear. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. ACI 301 for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.2 Drawings

1.6.2.1 Reinforcing Steel

ACI SP-66. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

1.6.3 Control Submittals

1.6.3.1 Curing Concrete Elements

Submit proposed materials and methods for curing concrete elements.

1.6.3.2 Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal shall include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete will be pumped.

1.6.3.3 Form Removal Schedule

Submit schedule for form removal indicating element and minimum length of time for form removal.

1.6.3.4 Material Safety Data Sheets

Submit Material Safety Data Sheets (MSDS) for all materials that are regulated for hazardous health effects. Prominently post the MSDS at the construction site.

1.6.4 Test Reports

1.6.4.1 Concrete Mix Design

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

1.6.4.2 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C 618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.4.3 Ground Iron Blast-Furnace Slag

Submit test results in accordance with ASTM C 989 for ground iron blast-furnace slag. Submit test results performed within 6 months of submittal date.

1.6.4.4 Aggregates

ASTM C 227 for potential alkali-silica reactions, ASTM C 295 for petrographic analysis.

1.6.5 Field Samples

PART 2 PRODUCTS

2.1 MATERIALS FOR FORMS

Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood: PS1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Steel form surfaces shall not contain irregularities, dents, or sags.

2.2 FORM TIES AND ACCESSORIES

The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement.

2.2.1 Polyvinylchloride Waterstops

COE CRD-C 572.

2.2.2 Dovetail Anchor Slot

Preformed metal slot approximately 1 by 1 inch of not less than 22 gage galvanized steel cast in concrete. Coordinate actual size and throat opening with dovetail anchors and provide with removable filler material.

2.3 CONCRETE

2.3.1 Contractor-Furnished Mix Design

ACI 211.1, ACI 301, and ACI 318/318R except as otherwise specified. The compressive strength (f'c) of the concrete for each portion of the structure(s) shall be as indicated.

2.3.1.1 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1. The trial mixture shall use at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required will be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast-furnace slag by weight equivalency method. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of material proposed for use shall have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39 for 7 and 28 days. From these results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition a curve shall be plotted showing the relationship between 7 and 28 day strengths.

2.3.1.2 Required Average Strength of Mix Design

The selected mixture shall produce an average compressive strength exceeding the specified strength by the amount indicated in ACI 301. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation shall be calculated and the required average compressive strength shall be determined in accordance with ACI 301. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength shall be as follows:

a. For f'c less than 3000 psi, 1000 psi plus f'c.

b. For f'c between 3000 and 5000 psi, 1200 psi plus f'c.

c. For f'c over 5000 psi, 1400 psi plus f'c.

2.4 MATERIALS

2.4.1 Cement

ASTM C 150, Type I or II or ASTM C 59/C 59M5, Type IP(MS) or IS(MS) blended cement except as modified herein. The blended cement shall consist of a mixture of ASTM C 150, Type II, cement and one of the following materials: ASTM C 618 pozzolan or fly ash, ASTM C 989 ground iron blast-furnace slag. The pozzolan or fly ash content shall

not exceed 25 percent by weight of the total cementitious material. The ground iron blast-furnace slag shall not exceed 50 percent by weight of total cementitious material. For exposed concrete, use one manufacturer for each type of cement, ground slag, fly ash, and pozzolan.

2.4.1.1 Fly Ash and Pozzolan

ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F. Add with cement.

2.4.1.2 Ground Iron Blast-Furnace Slag

ASTM C 989, Grade 120.

2.4.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

2.4.3 Aggregates

ASTM C 33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement. Aggregates shall show expansions less than 0.10 percent at 6 months when tested in accordance with ASTM C 227 using a cement with an alkali content above 0.8 percent (expressed as sodium oxide), and shall not possess properties or constituents that are known to have specific unfavorable effects in concrete when tested in accordance with ASTM C 295.

2.4.3.1 Recycled Aggregate Materials

Recycled aggregate to include: recovered concrete that meets the aggregate requirements specified. Submit recycled material request with the aggregate certification submittals and do not use until approved by the Contracting Officer.

2.4.4 Nonshrink Grout

ASTM C 1107.

2.4.5 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures.

2.4.5.1 High Range Water Reducer (HRWR) (Superplasticizers)

ASTM C 494/C 494M, Type F and Type G (HRWR retarding admixture) and ASTM C 1017/C 1017M.

2.4.6 Materials for Curing Concrete

2.4.6.1 Impervious Sheeting

ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

2.4.6.2 Pervious Sheeting

AASHTO M 182.

2.4.6.3 Liquid Membrane-Forming Compound

ASTM C 309, white-pigmented, Type 2, Class B.

2.4.7 Liquid Chemical Sealer-Hardener Compound

Compound shall be magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing, or other material applied to concrete.

2.4.8 Expansion/Contraction Joint Filler

ASTM D 1751, ASTM D 1752, or 100% recycled material meeting ASTM D 1752 (subparagraphs 5.1 to 5.4). Material shall be 1/2 inch thick, unless otherwise indicated.

2.4.9 Joint Sealants

2.4.9.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D 1190 or ASTM C 920, Type M, Class 25, Use T. ASTM D 1854 for surfaces subjected to jet fuel.

2.4.9.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C 920, Type M, Grade NS, Class 25, Use T.

2.4.10 Epoxy Bonding Compound

ASTM C 881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees F; Class B if placement temperature is between 40 and 60 degrees F; or Class C if placement temperature is above 60 degrees F.

2.4.11 Biodegradable Form Release Agent

Form release agent shall be biodegradable with a maximum of 350 grams/liter (g/l) volatile organic compounds (VOCs). Product shall not bond with, stain, or adversely affect concrete surfaces and shall not impair subsequent treatments of concrete surfaces. The form

release agent shall not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

2.5 REINFORCEMENT

2.5.1 Reinforcing Bars

ACI 301 unless otherwise specified. ASTM A 615/A 615M and ASTM A 617/A 617M with the bars marked A, S, W, Grade 60; or ASTM A 616/A 616M with the bars marked R, Grade 60.

2.5.2 Wire

ASTM A 82 or ASTM A 496.

2.5.3 Reinforcing Bar Supports

Provide bar ties and supports of coated or non corrodible material.

PART 3 EXECUTION

3.1 FORMS

ACI 301. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

3.1.1 Coating

Before concrete placement, coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

3.1.2 Removal of Forms and Supports

After placing concrete, forms shall remain in place for the time periods specified in ACI 347R. Prevent concrete damage during form removal.

3.1.2.1 Special Requirements for Reduced Time Period

Forms may be removed earlier than specified if ASTM C 39 test results of field-cured samples from a representative portion of the structure indicate that the concrete has reached a minimum of 85 percent of the design strength.

3.2 WATERSTOP SPLICES

Fusion weld in the field.

3.3 FORMED SURFACES

3.3.1 Tolerances

ACI 347R and as indicated.

3.3.2 As-Cast Form

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI 301. Provide bars, wire fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 Reinforcement Supports

Place reinforcement and secure with galvanized or non corrodible chairs, spacers, or metal hangers. For supporting reinforcement on the ground, use concrete or other non corrodible material, having a compressive strength equal to or greater than the concrete being placed.

3.4.2 Splicing

As indicated. For splices not indicated ACI 301. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires, plus 2 inches.

3.4.3 Cover

ACI 301 for minimum coverage, unless otherwise indicated.

3.4.4 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.5 Construction Joints

Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

3.4.6 Expansion Joints and Contraction Joints

Provide expansion joint at edges of interior floor slabs on grade abutting vertical surfaces, and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

ASTM C 94/C 94M, ACI 301, ACI 302.1R, and ACI 304R, except as modified herein. Batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs entitled "Sampling" and "Testing."

3.5.2 Mixing

ASTM C 94/C 94M and ACI 301. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 85 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10 foot centers maximum in each direction when pouring interior slabs and on 20 foot centers maximum for exterior slabs.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width shall be a minimum of 4 inches greater than indicated.

3.6.2 Vibration

ACI 301. Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18 inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.6.3 Cold Weather

ACI 306.1. Do not allow concrete temperature to decrease below 50 degrees FObtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.6.4 Hot Weather

ACI 305R. Maintain required concrete temperature using Figure 2.1.5 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes,

spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.7 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.7.1 Defects

Repair formed surfaces by removing minor honeycombs, pits greater than 1 square inch surface area or 0.25 inchmaximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with nonshrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of ACI 347R. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise specified.

3.7.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

3.7.3 Formed Surfaces

3.7.3.1 Tolerances

ACI 117 and as indicated.

3.7.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view. Patch this holes and defects and level abrupt irregularities. Remove or rub off fins and other projections exceeding 0.25 inch in height.

3.8 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI 302.1R, unless otherwise specified. Where straightedge measurements are specified, Contractor shall provide straightedge.

3.8.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.8.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious applications. After the concrete has been placed, consolidated, struck off, and leveled to a Class C tolerance as defined below, the surface shall be roughened with stiff brushes of rakes before final set.

3.8.2 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

3.9 CURING AND PROTECTION

ACI 301 unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating.

3.9.1 Moist Curing

Remove water without erosion or damage to the structure.

3.9.1.1 Ponding or Immersion

Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.9.1.2 Fog Spraying or Sprinkling

Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.9.1.3 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet

sheeting thoroughly and keep continuously wet throughout the curing period.

3.9.1.4 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.9.2 Liquid Membrane-Forming Curing Compound

Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

3.9.2.1 Application

Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Re-spray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3.9.2.2 Protection of Treated Surfaces

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.9.3 Liquid Chemical Sealer-Hardener

Apply sealer-hardener to interior floors not receiving floor covering and floors located under access flooring. Apply the sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and openings in which joint sealant is to be applied as

required by the joint sealant manufacturer. The sealer-hardener shall not be applied until the concrete has been moist cured and has aged for a minimum of 30 days. Apply a minimum of two coats of sealer-hardener.

3.9.4 Curing Periods

ACI 301 except 10 days for retaining walls, pavement or chimneys, 21 days for concrete that will be in full-time or intermittent contact with seawater, salt spray, alkali soil or waters. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Contracting Officer.

3.10 FIELD QUALITY CONTROL

3.10.1 Sampling

ASTM C 172. Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

3.10.2 Testing

3.10.2.1 Slump Tests

ASTM C 143/C 143M. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.10.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.10.2.3 Compressive Strength Tests

ASTM C 39. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests of each mix design of and for concrete placed each day shall be taken not less than once a day, nor less than once for each 100 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three

consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 500 psi, take a minimum of three ASTM C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.10.2.4 Air Content

ASTM C 173/C 173M or ASTM C 231 for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.10.2.5 Ion Concentration

ACI 318M/318RM. Determine water soluble ion concentration. Perform test once for each mix design.

-- End of Section --