DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 889
SAVANNAH, GEORGIA 31402-0889

REPLY TO
ATTENTION OF:

August 12, 2004

Contracting Division
A-E and Construction Branch

SUBJECT: DACA21-03-D-0015, Multiple Award Task Order Contract Construction and Design/Build for North Carolina (and SAD)

TMS Contracting, LLC
635 Frosty Morn Drive
Clarksville, Tennessee 37040

Gentlemen:

You are requested to submit a price proposal for work detailed in the scope of work, drawings and specifications posted on our website. The Task Order Request Number is TONC11-03-D-0014. The title of the task order is Package P, Civil Projects, Fort Bragg, North Carolina. The period of performance is 216 calendar days after Notice to Proceed for Construct LCID/C&D Landfill Expansion (FW00051-2P); 144 calendar days after Notice to Proceed for Repair/Improve Drainage in Wildlife Branch (FW00057-3P); and 180 calendar days after Notice to Proceed for Repair Concrete Drainage, A Street (FW 00069-2P). Liquidated damages are $536.96 per day.

This is a high priority requirement as defined in Army Federal Acquisition Regulation – AFAR Supplement 5101.602-2. Subject to availability of funds, the accounting classification will be: 21 4 2050 408 8021 P7000 3220 S09133. This project is also included in the financial plan for FY-05 at which time the accounting classification will be 21 5 2050 508 8021 P7000 3220 S09133. This statement is not a commitment of funds. Funds are not presently available for this acquisition. No contract award will be made until appropriated funds are made available from which payment for contract purposes can be made.

You are reminded that this project is being completed among your firm, The Clement Group, and GSC Contruction. Award will be made based on price.

To access the scope of work and specifications, and drawings go to http://ebs.sas.usce.army.mil. Scroll down the page to you come to the "blue" label that reads Construction – Simplified Acquisition. Select the project Number pertaining to your Solicitation/Contract TONC11-03-D-0015.

Your proposal should be signed by a duly authorized official of your company and is required no later than 2:00 P.M. local time August 31, 2004 to the above address ATTN: CT-C/Linda Elliott. You may fax your proposal to (912) 652-6001.

If you have any questions, please contact Linda Elliott at (912) 652-5076 or Catherine Applegate at (912) 652-5755.

Sincerely,

Julie A. Anderson

Julie A. Anderson
Contracting Officer

Enclosures

SCOPE OF WORK
8 AUG 04

TASK ORDER FOR CONSTRUCTION OF CIVIL PROJECTS, FORT BRAGG, NC

1. **DESCRIPTION OF WORK:** Furnish all labor, equipment, incidentals, supervision and transportation for work necessary to construct Civil Projects. All work shall be performed in accordance with the MATOC contract specifications, manufacturer's recommendations, and state building codes. All work shall comply with the Uniform Building Code, Life Safety Code, National Standard Plumbing Code and manufacturer's recommended practices. All electric work shall comply with NFPA 70, National Electric Code and NFPA 13 and 101, Life Safety Code and manufacturer's recommendations.

2. **PERFORMANCE PERIOD:** Base Bid: 216 calendar days after Notice to Proceed on Base Bid
Option 1: 144 calendar days after Notice to Proceed on Option 1
Option 2: 180 calendar days after Notice to Proceed on Option 2

The options will be executed within 180 days after the task order award.

3. **CONTRACTOR REQUIREMENTS:**

A. Project Involves Handling of Asbestos: No

B. Occupancy During Construction: Yes for Base Bid and Option 2, Specification Section 01005

C. Phasing of Work: No

D. Construction Schedule: NAS

E. CQC System Requirements: CQC System Manager

4. **PRE-BID CONFERENCE:** No

5. **CONTRACT REQUIREMENTS:**

A. After task order award:
FRP0001 - Site Safety and Health Plan
FRP0002 - Quality Control Program
FRP0004 – Price Proposal
FRP0006 - Work Schedule
FRP0007 - Weekly Progress Report
FRP0016 - As-Built/In Progress Drawings

B. After construction completion, prior to final payment:
FRP0010 - Operation and Maintenance Manuals to include Videos

FRP0012 - Equipment and Construction Warranties
FRP0017 - As-Built/Final Drawings

6. GOVERNMENT FURNISHED ITEMS/WORK: N/A

7. INTERFACE WITH GOVERNMENT PERSONNEL: Access to and from the site shall be coordinated through the Fort Bragg Area Office, POC Ken Gray at (910) 396-1211 ext 248.

8. WAGE DETERMINATION: NC030009 Heavy

9. LIQUIDATED DAMAGES: The contractor shall be assessed the amount of $536.96 liquidated damages per calendar day for failure to complete the prescribed work within the performance period stated in paragraph 2, above.

10. TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	9	6	4	4	6	8	7	4	4	5	9

11. PAYMENT OFFICE:
NC Area Office Bragg
Bldg 3-1933, Butner Road
Fort Bragg, NC 28307-0247

12. ENCLOSURES:

A. Specifications: See Specification Indexes.

B. Drawings: TONC11

13. PRE BID SITE VISIT: Prior to the submission of any bids, all bidders are required to visit the project site location to become familiar with the project requirements. Failure to visit the project site will not disqualify a bid; however, the bidder is required to comply with the terms and conditions of any resultant contract by reason of such failure. In no event will a failure to inspect the site constitute grounds for a claim after award of the task order.

14. EXCAVATION PERMIT: The contractor shall have a completed and approved PWBC Excavation Permit prior to any excavation, to include sign or fence-post holes. The Contractor shall schedule an appointment to locate utility lines at least 5 days prior to any excavation with the PWBC Facilities Maintenance Division. A copy of the PWBC Excavation Permit will be provided at the Prework Conference. The Contractor shall be responsible for coordination with the Information Technology Business Center (ITBC), Outside Plant Branch, for locating communication lines prior to any excavation.

15. DISPOSAL AND BORROW PERMITS:

a. Disposal Permits: A permit is required to use the installation land clearing and inert debris and demolition landfills. Landfill permits shall be processed with the Environmental Compliance Branch of the PWBC Environmental & Natural Resources Division. Permits are issued for the life of the specific contract only. Only materials produced on the project for which the permits are issued may be disposed of in the land clearing and inert debris and demolition landfills. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract disposal operation. Copies of the disposal permit forms will be provided at the Prework Conference.
b. Borrow Permits: A permit is required to use the Fort Bragg borrow material pits. Borrow pit permits shall be processed with the Environmental Compliance Branch of the PWBC Environmental & Natural Resources Division. Permits are issued for the life of the specific contract only. Borrow materials may only be used on the project for which the permits are issued. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract borrow operation

16. HAUL ROUTES: The Contractor is required to obtain approval from the Resident Office for the routes he intends to use for transportation of borrow materials, construction debris, or demolition materials unless otherwise permitted in writing by the Resident. The axle load of earth-hauling equipment operating on paved streets shall not exceed 12,000 pounds.

17. UTILITY OUTAGES AND ROAD CLOSURES: Utility, road and railroad closures require a minimum 10 working days advance written notice and will be subject to Resident Office approval. In the case of a road closures, a sketch shall be provided showing the closure location and all necessary signs and barricades. Necessary signage, barricades, flag persons, lights (including temporary traffic control lights), and markings for the safe movement of the public during construction shall be in accordance with the Manual on Uniform Traffic Control Devices, and shall be provided at no additional expense to the Government.

18. AVAILABILITY AND USE OF UTILITY SERVICES: Utility services required on the job site for the accomplishment of the work will be furnished at no cost to the Contractor; however, the Government will make no connections or alterations to the existing utility systems for the Contractor. Utilities for offices and/or storage buildings or areas will be billed to the Contractor monthly and will not be furnished free of charge. The Contractor shall be responsible for installing meters or other connections at no cost to the Government. At the conclusion of the contract, the Contractor shall remove all temporary connections, distribution lines, meters and associated paraphernalia unless otherwise directed by the Resident Office. Prior to installing any utility connections at an office/storage site, the plan will be approved by the Resident Office. When utility meters are installed, the Contractor shall notify the Resident Office for the initial meter reading. Failure to obtain this initial reading will result in the Contractor being charged for the entire amount shown on the meter.

19. CONTRACTOR STORAGE AND TRAILERS: The Contractor shall place or paint a sign on all of his storage trailer(s) and building(s) used on this contract. At a minimum, the sign shall contain the name of the Contractor and a telephone number at which the contractor can be reached. The trailer(s) and building(s) shall be completed with gates and/or doors which can be locked. Only material for this project shall be stored in the trailer(s) or building(s). The Contractor shall remove the storage trailer(s) or building(s) within 30 days after completion of the contract and prior to submitting his final invoice. The area around the storage trailer(s) and building(s) shall be kept clean.

20. SAFETY: Safety will be incompliance with the Corps of Engineers Safety Manual EM 185-11-1. Use of appropriate safety equipment is mandatory and not limited to hard hats and steel-toed shoes. Contractor is responsible for daily clean up and complete restoration of the area once the contract is complete.

21. HOURS OF WORK: Work shall be accomplished between the hours of 0730 thru 1630 hours daily, Monday through Friday on non-Government holidays. Legal holidays falling on Saturday are observed on the proceeding Friday and those falling on Sunday are observed on the following Monday. Work schedule and facility security to be coordinated with the Resident Office for facility access and security maintenance during duration of work. Contractor shall not work outside of the stated hours of work, without first obtaining approval from the Resident Office.

22. WARRANTY: The contractor shall provide a minimum of one (1) year warranty on all materials and workmanship from the date of the Government's acceptance of the work.

END OF SCOPE

SUPPLIES OR SERVICES AND PRICES/COST SCHEDULE
CIVIL PROJECTS
FT. BRAGG, NORTH CAROLINA

TOTAL BID ITEMS 0001 THROUGH 0003 ---------- $_____._____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001	BASE BID	1.00	Lump Sum	XXXX	$_____

Construct LCID/C&D Landfill Expansion (FW00051-2P).

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002	OPTION 1	1.00	Lump Sum	XXXX	$_____

Repair/Improve Drainage at Wildlife Branch (FW00057-3P).

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003	OPTION 2	1.00	Lump Sum	XXXX	$_____

Repair Concrete Drainage, A Street (FW00069-2P).

General Decision Number NC030009 06/13/2003 NC9

Superseded General Decision No. NC020009

State: North Carolina

Construction Type:
HEAVY

County(ies):
STATEWIDE

SEWER AND WATER CONSTRUCTION PROJECTS AND HEAVY CONSTRCUTION PROJECTS (excluding Dam construction projects).

Modification Number	Publication Date
0	06/13/2003

COUNTY(ies):
STATEWIDE

SUNC2001A 02/12/1990

	Rates	Fringes
BOILERMAKERS:		
Storage Tank Erection/Repair	12.96	4.105
All Other Work:	16.20	4.105
BRICKLAYERS	7.23	
CARPENTERS	6.63	
CEMENT MASONS/FINISHERS	6.11	
ELECTRICIANS	8.56	
FENCE ERECTORS	5.15	
IRONWORKERS	8.20	
LABORERS:		
Unskilled	5.15	
Air Drill Operator	5.92	
Asphalt Rakers	5.15	
Pipelayers	5.17	
MANHOLE BUILDERS	5.81	
MILLWRIGHTS	5.27	
PAINTERS	7.12	
PLUMBERS & PIPEFITTERS	7.42	
POWER EQUIPMENT OPERATORS:		
Asphalt Distributor	5.77	
Asphalt Finisher	5.69	
Asphalt Paver	5.69	
Asphalt Screed	5.69	
Backhoe	6.40	
Boring Machine	5.65	
Bulldozer	5.96	
Crane	7.60	
Dragline	6.34	
Drill	7.23	
Loader	5.79	
Mechanic	7.16	
Motor Grader	6.24	
Roller	5.15	
Scraper, Pan	5.42	

Tractor	5.49
Trenching	6.58
Well Drillers	6.50
TRUCK DRIVERS	5.15
TV & GROUTING TECHNICIANS	9.21

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within

the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment

data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

DIVISION 01 - GENERAL REQUIREMENTS

01005 GENERAL AND SPECIAL PROVISIONS
01330 SUBMITTAL PROCEDURES
01420 SOURCES FOR REFERENCE PUBLICATIONS
01451A CONTRACTOR QUALITY CONTROL
01500A TEMPORARY CONSTRUCTION FACILITIES
01780 AS-BUILT DRAWINGS SUBMITTALS

DIVISION 02 - SITE CONSTRUCTION

02013 ENVIRONMENTAL PROTECTION DURING CONSTRUCTION
02300A EARTHWORK
02373 GEOTEXTILE
02630 STORM DRAINAGE
02921B EROSION CONTROL AND TURF SEEDING

-- End of Project Table of Contents --

SECTION 01005

GENERAL AND SPECIAL PROVISIONS

1. SCOPE OF WORK: The work consists of furnishing all labor, equipment, transportation, and materials necessary to perform all work in strict accordance with these specifications, schedules, applicable PWBC Drawings, and other contract documents. The scope of work of this contract includes, but is not limited to, the following specific items of work:

1.1 Civil Work.

1.1.1 Construction of sediment and erosion control measures.

1.1.2 Excavation and grading of proposed subgrades.

1.1.3 Installation of permanent stormwater features.

1.2 Architectural Work. None.

1.3 Mechanical Work. None.

1.4 Electrical Work. None.

1.5 Landscaping and Grounds Restoration Work.

1.5.1 Provide vegetative stabilization as shown on the plans.

2. PROJECT REQUIREMENTS:

2.1 Installation Regulations. The employees of the Contractor will be required to abide by all installation regulations as published by the Commanding Officer. A copy of these regulations can be obtained from the Area/Resident Engineer at the installation. All costs in connection therewith shall be included in the contract price for the work.

2.2 Bulletin Board. Immediately upon beginning of work, the Contractor shall provide a weatherproof, glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of the work the bulletin board shall be removed by and remain the property of the Contractor.

2.3 Time of Performance. All work shall be performed between 7:30 a.m. and 4 p.m. excluding official holidays, unless otherwise indicated or approved by the Contracting Officer. Requests to work during other than these normal hours shall be made in writing at least 36 hours in advance. For example, a request to work on a Saturday shall be submitted no later than Thursday at noon.

2.4 Certificates of Compliance and Material Submittals. The Contractor shall submit for approval all certificates of compliance and material submittals required in these technical provisions. Required submittals shall be submitted for approval not later than 30 days prior to the approval date needed to achieve compliance with the approved project schedule. Approval must be received from the Contracting Officer or his representative before incorporating the materials into the work. The Contractor shall provide a Submittal Register listing all required submittals in the contract to the COR at the time of the first submittal. Submittal forms (form 59-2-R) and a sample Submittal Register (Form 4288) will be provided at the Prework Conference.

2.5 Safety and Environmental Plans. The Contractor shall submit a proposed safety plan in accordance with the current Corps of Engineers Safety Manual, EM-385-1-1, and shall submit an environmental protection plan in accordance with specifications section 02013, Environmental Protection During Construction, if included in these technical provisions. A sample safety plan form will be provided at the Prework Conference.

2.6 Quality Control. The Contractor shall provide the job superintendent's name and telephone number to the Construction Management Division of the PWBC; building 3-1933, Butner Road; (910) 396-2308, prior to commencement of work. The Contractor shall furnish a daily Contractor Quality Control (CQC)/Superintendent's work report to the Contracting Officer's Representative (COR). A sample CQC report form will be provided at the Prework Conference.

2.7 Excavation Permit. The Contractor shall have a completed and approved PWBC Excavation Permit in his possession prior to any excavation, to include sign or fence-post holes. The Contractor shall schedule an appointment to locate utility lines at least 24 hours prior to any excavation with the PWBC Facilities Maintenance Division; building 3-1634, Butner Road; (910) 396-2772. A copy of the PWBC Excavation Permit will be provided at the Prework Conference. The Contractor shall also be responsible for coordination with the Information Technology Business Center (ITBC), Outside Plant Branch; building 1-1434, Scott Street; (910) 396-8200, for locating communication lines prior to any excavation.

2.8 Disposal and Borrow Permits.

2.8.1 Disposal Permits. A permit is required to use the installation land clearing and inert debris and demolition landfills. Landfill permits shall be processed with the Environmental Compliance Branch of the PWBC Environmental Sustainment Division; building 3-1333, Butner Road; (910) 396-3341, extension 358. Permits are issued for up to one year’s duration and for the specific contract only. Only materials produced on the project for which the permits are issued may be disposed of in the land clearing and inert debris and demolition landfills. The

Contractor shall sort the debris for like materials, such as construction and debris material, inert debris, etc. All metal products should be brought to the landfill separately and placed in the applicable container. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract disposal operation. Copies of the disposal permit forms will be provided at the Prework Conference. The land clearing and inert debris and demolition debris disposal site locations are shown on the drawings. Landfills and transfer site are open for customer service from 0730 to 1500 Monday through Friday except Federal holidays. When directed by the Contracting Officer the landfills may be available on an as-required basis for 2 to 6 hours approximately 12 weekends per year (Saturday, Sunday and Holiday).

2.8.2 Borrow Permits. A permit is required to use the Fort Bragg borrow material pits. Borrow pit permits shall be processed with the PWBC Facilities Maintenance Division; Roads and Equipment Branch; Building O-3454, Lamont Road, 396-6873. Permits are issued for the life of the specific contract only. Borrow materials may only be used on the project for which the permits are issued. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract borrow operation. Copies of the borrow permit forms will be provided at the Prework Conference. The borrow pit location is shown on the drawings.

2.9 Haul Routes. The Contractor is required to use the haul routes shown on the contract drawings for transportation of borrow materials, construction debris, or demolition materials unless otherwise permitted in writing by the COR. When haul routes are not designated in the contract, the Contractor must obtain approval from the COR for the routes he intends to use. The axle load of earth-hauling equipment operating on paved streets shall not exceed 12,000 pounds.

2.10 Utility Outages and Road Closures. Utility, road, and railroad closures require minimum 10 working days advance written notice and will be subject to COR approval. A sample utility outage/road closure request form will be provided at the Prework Conference. In the case of road closures, a sketch shall be provided showing the closure location and all necessary signs and barricades. Necessary signage, barricades, flagpersons, lights (including temporary traffic control lights), and markings for the safe movement of the public during construction shall be in accordance with the Manual on Uniform Traffic Control Devices, and shall be provided at no additional expense to the Government.

2.11 AVAILABILITY AND USE OF UTILITY SERVICES.

2.11.1 Payment for Utility Services
The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to and paid for by the Contractor at the prevailing rates. The rates listed below are current as of [insert date] and are subject to change. The Contractor shall carefully conserve all utilities furnished.

2.11.2 Meters and Temporary Connections

The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections, distribution lines, and meters required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall notify the Contracting Officer's Representative, in writing, 10 working days before the temporary connection is made so that a utilities contract can be established. The Contracting Officers Representative will then provide the contractor with the name and phone number of who to contact for setting up the utility contract. For temporary electrical connections the Government or applicable utility provider will provide the meter (meter base provided by contractor) and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor shall not make the final electrical connection. For temporary water and sewer connections the contractor will provide the meter and after inspection/approval by the Contracting Officer's Representative make the final connection at the contractor's expense.

2.11.3 Use of Permanent Building Utility Connections
Utilities consumed by the contractor from permanent building utility connections shall also be metered and paid for by the contractor. When the permanent system is activated the initial meter reading shall be recorded and reported as specified below. On building renovation projects the initial meter reading shall be recorded when the contractor is given possession of the building to perform the work. The contractor shall pay for utilities consumed through the permanent building connection until the work has been completed or the government has occupied the facility, which ever occurs first.

2.11.4 Advance Deposit
An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

2.11.5 Initial Meter Readings
Upon installation of the meter, the initial reading shall be recorded (in the presence of the Contracting Officer's Representative) and forwarded to the point of contact for utility service with a copy to the Contracting Officer's Representative.

2.11.6 Final Meter Reading
Before completion of the work and final acceptance of the work by the Government, the Contractor shall notify the Contracting Officer and the applicable utility provider, in writing, 10 working days before termination is desired. The Government or applicable utility provider will take a final meter reading. Electric service will be disconnected by the provider. Water and sewer connections will be disconnected by the contractor, at his expenses and by a method approved by the Contracting Officer's Representative. The Contractor shall then remove all the temporary distribution lines, meters, meter bases, and associated

paraphernalia. The Contractor shall pay all outstanding utility bills before final acceptance of the work by the Government.

2.11.7 Requirement for backflow prevention on temporary/permanent potable water connections.
The contractor shall install a backflow prevention device on all connections to the potable water system. The backflow prevention device shall be a reduced pressure or double check type, meeting all the State code requirements for backflow preventers on potable water. If the contractor request the use of a fire hydrant and receives approval from the Contracting Officer's Representative a backflow prevention device and meter shall be installed prior to each use.

2.11.8 Utilities Charge Rates
Water ---------- $1.70 per 1,000 gallons
Electricity ------ $0.0657 per KW hour
Sewer ---------- $10.00/month for each connected trailer up to single wide size.
The rate for larger trailers will be determined by the utility provider, however, this rate will not exceed $20.00/month per trailer.

2.12 As-Built Record Drawings. The Contractor shall be responsible for maintaining one set of master prints at the job-site on which he shall keep a careful and neat record of all deviations from the original contract drawings as the work progresses. The Contractor shall note all changes and corrections on these record drawings promptly as the changes occur, but in no case less often than a weekly basis. In addition to incorporated modifications, these record drawings shall also include the actual location of all subsurface utility lines installed or encountered, and the type of materials used. The marked-up/annotated prints, or the annotated electronic drawings if applicable, shall be certified as to their correctness by an authorized representative of the Contractor and turned-over to the COR not later than 10 days after acceptance of the work by the Government.

2.13 Project Sign. The Contractor shall furnish and install a project sign at the location selected by the Contracting Officer. The project sign shall be painted on 1/2 inch thick exterior grade plywood. The sign layout shall be in accordance with the graphic format shown in Attachment 1 of Section 00800 at the end of this section."

2.14 Color Boards. [Omitted.]

2.15 Construction Debris Leaving Site. All construction debris/trash that leaves the project site will be covered from the time that it leaves the construction site. Any mud or soil which leaves the project site will be cleaned up by the Contractor immediately upon discovery or notification of such an occurrence.

2.16 Protection. Contractor is responsible to provide such covering, shields and barricades as are required to protect building occupants, equipment, stores, supplies, etc., from dust, debris, weather intrusion, water, moisture or other cause of damage resulting from construction.

2.17 Replacement. The Contractor shall be held responsible for the replacement of any utility systems, facilities, or Government equipment damaged during the course of the contract.

2.18 Cleanup. Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

2.19 Sanitation. The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

3. SPECIAL PROVISIONS:

3.1 Occupancy. Interference with and inconvenience to the occupants or routine use of the facility shall be held to an absolute minimum. The Contractor is responsible for providing such covering, shields, and barricades as are required to protect the facility occupants, furniture, equipment, supplies, etc., from dust, debris, weather intrusion, or other cause of damage resulting from construction.

3.2 Contractor Vehicle/Equipment Access to Fort Bragg. Fort Bragg is a closed installation, and vehicular access is controlled. Contractors are required to register each vehicle that will be traveling installation roads or streets under its own power. Each such vehicle shall have a registration decal. Registration may be accomplished at the Main Vehicle Registration Center, building 8-1078 on Randolph Street near Bragg Boulevard, 0800-1700 hours Monday through Friday. Unregistered vehicles should expect be stopped and delayed at all access control points. Contractors and all commercially registered vehicles shall use the Knox Street access control point off Bragg Boulevard for all access to Fort Bragg.

3.3 Special Access Requirements.

3.3.1 NC DENR-Land Resources for inspection of erosion control measures (910-486-1541).

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SECTION 01330

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SECTION 01330

SUBMITTAL PROCEDURES
05/02

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Government-Furnished Information

Submittal register is included at the end of this section. Register 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.

1.2 DEFINITIONS

1.2.1 Submittal

Shop drawings, product data, samples, operation and maintenance data, and administrative submittals presented for review and approval. 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."

1.2.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.

b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

d. Operation and Maintenance (O&M) Data: Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item. The data is required when the item is delivered to the project site.

e. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.3 SUBMITTAL IDENTIFICATION (SD)

Submittals required 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 values.
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 or equipment for some portion of the work.

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

SD-04 Samples

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

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 checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements 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 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.

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-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

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

1.3.1 Approving Authority

Person authorized to approve submittal.

1.3.2 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.

1.4 SUBMITTALS

Submit the following in accordance with the requirements of this section.

SD-01 Preconstruction Submittals

Submittal register; G

1.5 USE OF SUBMITTAL REGISTER

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.

1.5.1 Submittal Register

Submit submittal register. Submit with quality control plan and project schedule. Do not change data in columns (c), (d), (e), and (f) as delivered by the government. Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register.

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.

1.5.2 Contractor Use of Submittal Register

Update the following fields.

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.

1.5.3 Approving Authority Use of Submittal Register

Update the following fields.

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to contractor.

1.5.4 Contractor Action Code and Action Code

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

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.5.5 Copies Delivered to the Government

Deliver one copy of submitted register updated by contractor to government with each invoice request.

1.6 PROCEDURES FOR SUBMITTALS

1.6.1 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.

1.6.2 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.

1.6.3 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.

1.6.4 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.

1.6.4.1 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).

1.6.4.2 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.

1.6.4.3 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.

1.6.4.4 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.

1.6.5 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.

1.6.6 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 [_____], 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 [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved [as noted] 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 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.

1.6.7 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.

1.6.8 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.

1.7 FORMAT OF SUBMITTALS

1.7.1 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.

1.7.2 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.

1.7.3 Format for 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.

1.7.4 Format of Product Data

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.

1.7.5 Format of 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.

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.7.6 Format of Operation and Maintenance (O&M) Data

a. O&M Data format shall comply with the requirements specified in Section 01781, Operation and Maintenance Data"

1.7.7 Format of Administrative 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.

1.8 QUANTITY OF SUBMITTALS

1.8.1 Number of Copies of Shop Drawings

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

1.8.2 Number of Copies of Product Data

Submit product data in compliance with quantity requirements specified for shop drawings.

1.8.3 Number of 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.

1.8.4 Number of Copies of Operation and Maintenance Data

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

1.8.5 Number of Copies of Administrative Submittals

a. Unless otherwise specified, submit 3 copies of administrative submittals.

1.9 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.9 Government Approved

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.10 Information Only

All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.11 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory.

Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.12 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Any "information only" submittal found to contain errors or unapproved deviations shall be resubmitted as one requiring "approval" action. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.13 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations.

1.14 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager, and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.15 SUBMITTAL REGISTER

At the end of this section is a submittal register showing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required.

The Contractor is required to complete the submittal register and submit it

to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. The submit dates and need dates used in the submittal register shall be coordinated with dates in the Contractor prepared progress schedule. Updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates shall be submitted monthly or until all submittals have been satisfactorily completed. When the progress schedule is revised, the submittal register shall also be revised and both submitted for approval.

1.16 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 20 working days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 10 working days shall be allowed and shown on the register for review and approval of submittals for food service equipment and refrigeration and HVAC control systems.

1.17 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.18 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.18.1 Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

1.18.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.19 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.20 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Three copies of the submittal will be retained by the Contracting Officer and two copies of the submittal will be returned to the Contractor.

1.21 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.22 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s).

SIGNATURE: _____

TITLE: _____

DATE: _____

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
LCID/C&D Landfill

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01330	SD-01 Preconstruction Submittals															
			Submittal register	1.5.1	G													
		01780	SD-02 Shop Drawings															
			As-Built Drawings	1.2.1	G													
		02300A	SD-03 Product Data															
			SELECTION OF BORROW	3.3	G													
			MATERIAL															
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			SD-07 Certificates															
			Testing	3.13	G													
		02373	SD-07 Certificates															
			Geotextile	2.1	G													
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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS

12/02

PART 1 GENERAL

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SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS
12/02

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.

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Internet: http://www.abma-dc.org

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Phone: +44 (0)20 8996 9000
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Email: Info@bsi-global.com
Website: http://www.bsi-global.com

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Fax: 212-370-9047
Internet: http://www.buildershardware.com

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Dalton, GA 30720
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Internet: http://www.carpet-rug.com

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Chattanooga, TN 37421
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Fax: 423-892-0817
Internet: http://www.cispi.org

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Internet: http://www.cdc.gov

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FAX: 216-241-0105
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Internet: http://www.cl2.com

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FAX: 216-241-0105
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4221 Walney Road, 5th Floor
Chantilly, VA 20151-2923
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14150 Newbrook Dr.Suite 200
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e-mail: techdept@dhi.org

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SECTION 01451A

CONTRACTOR QUALITY CONTROL
01/03

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 basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 5 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer shall be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified

deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The

Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation shall be promptly furnished to the CQC organization by the Contractor. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, or have a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: civil, materials technician, submittals clerk. These individuals shall be directly employed by the prime Contractor and may not be employed by a supplier or sub-contractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
b.	Submittals	Submittal Clerk with 1 yr experience
c.	Concrete, Pavements and Soils	Materials Technician with 2 yrs experience for the appropriate area

Experience Matrix

Area	Qualifications

3.4.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 15950A HEATING, VENTILATING AND AIR CONDITIONING (HVAC) CONTROL SYSTEMS; 15951A DIRECT DIGITAL CONTROL FOR HVAC; 15990A TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS; or 15995A COMMISSIONING OF HVAC SYSTEMS are included in the contract, the submittals required by those sections shall be coordinated with Section 01330 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the

contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection 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.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final 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 Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. 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 titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 12 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

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. 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 or for excess costs or damages by the Contractor.

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SECTION 01780

AS-BUILT DRAWINGS SUBMITTALS

05/02

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SECTION 01780

AS-BUILT DRAWINGS SUBMITTALS
05/02

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

As-Built Drawings; G

Drawings showing final as-built conditions of the project. The CADD drawings shall consist of two sets of completed final as-built drawings on separate media. One set of media shall be CADD drawing files. The other set of media shall consist of one set of mylars, two sets of blue line prints of the mylars, and the approved marked working as-built prints.

Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.

1.2 PROJECT RECORD DOCUMENTS

1.2.1 As-Built Drawings

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract drawings which are revised to be used for final as-built drawings.

1.2.1.1 Government Furnished Materials

One set of electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file as-built drawings.

1.2.1.2 Working As-Built and Final As-Built Drawings

The Contractor shall revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Final as-built drawings shall be prepared after the completion of specific phases of work foundations, utilities, structural steel, etc., as appropriate for the

project. The working as-built marked prints and final as-built drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior incremental submission of each monthly pay estimate. If the Contractor fails to maintain the working and final as-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. Noncompliance with regard to maintaining as-built drawings will be considered for an interim unsatisfactory Contractor performance evaluation. The working and final as-built drawings shall show, but shall not be limited to, the following information thereto:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

b. The location and dimensions of any changes within the building structure.

c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or modifications which result from the final inspection.

g. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.

h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

j. Modifications (change order price shall include the Contractor's cost to change working and final as-built drawings to reflect modifications) and comply with the following procedures.

(1) Directions in the modification for posting descriptive changes shall be followed.

(2) A Modification circle shall be placed at the location of each deletion.

(3) For new details or sections which are added to a drawing, a modification circle shall be placed by the detail or section title.

(4) For minor changes, a modification circle shall be placed by the area changed on the drawing (each location).

(5) For major changes to a drawing, a modification circle by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, a modification circle shall be placed either by the schedule heading or by the change in the schedule.

(7) The modification circle size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.2.1.3 Drawing Preparation

The as-built drawings shall be modified as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, adding drawings as may be necessary. At the time of final inspection, 1 copy of the working as-built prints shall be delivered to the Contracting Officer for review and approval. These working as-built marked prints shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned to the Contracting Officer. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

1.2.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only personnel proficient in the preparation of CADD drawings shall be employed to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings shall be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols shall be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same guidance specified for original drawings. The title block and drawing border to be used for any new final as-built drawings shall be identical to that used on the contract drawings. Additions and corrections to the contract drawings shall be accomplished using CADD files. The Contractor will use the most current version of Microstation software using Windows NT operating system. The electronic files will be supplied on ISO 9660 Format compact discs, read-only memory (CD-ROM). The Contractor shall be responsible for providing all program files and hardware necessary to prepare final as-built drawings. The Contracting Officer will review final as-built drawings for accuracy and the Contractor shall make required corrections, changes, additions, and deletions.

a. When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high. All other contract drawings shall be marked either "AS-BUILT" drawing denoting no revisions on

the sheet or "Revised As-Built" denoting one or more revisions. Original contract drawings shall be dated in the revision block.

b. After receipt by the Contractor of the approved working as-built prints and approval of completed sections of final as-builts the Contractor shall, within 10 days for each specific phase of work for contracts less than $5 million, or 20 days for each specific phase of work for contracts $5 million and above, make the final as-built submittal. This submittal shall consist of one ISO 9660 compact disc, read-only memory (CD-ROM), one set of mylars, and two sets of prints of these drawings and the return of the approved marked working as-built prints. They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transaction or adjustments necessary to accomplish this are the responsibility of the Contractor. The Government reserves the right to reject any any drawing files it deems incompatible with the customer's CADD system. All paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final as-built drawing files and marked prints as specified shall be cause for with holding any payment due the Contractor under this contract and shall be grounds for a final unsatisfactory Contractor performance evaluation. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.2.1.5 Payment

No separate payment will be made for as-built drawings required under this contract, and all in connection therewith shall be considered a subsidiary obligation of the Contractor.

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 02013

ENVIRONMENTAL PROTECTION DURING CONSTRUCTION

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8. Post-Construction Cleanup
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10. Maintenance of Pollution Control Facilities
11. Training in Pollution Control

1. SCOPE: This section covers prevention of environmental pollution and damage to the environment as the result of construction operations under this contract and for those measures set forth in other technical provisions of these specifications. For the purpose of this specification, environmental pollution and damage to the environment is defined as 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, cultural, and/or historical purposes. The control of environmental pollution and damage requires consideration of the potential effects of an action upon air, water, and land resources, and includes management of visual aesthetics, natural and cultural resources, noise levels, solid waste, hazardous waste, toxic waste, radiant energy, and radioactive materials, as well as other pollutants.

2. QUALITY CONTROL: The Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. The Contractor shall record on daily reports any problems in complying with laws, regulations, ordinances, and corrective action taken. The Contractor shall immediately inform the Contracting Officer's Representative of any environmental problem.

3. ENVIRONMENTAL PROTECTION PLAN: The Contractor shall submit an Environmental Protection Plan which must be approved by the PWBC Environmental/Natural Resources Division prior to construction. It shall include, but is not limited to, the following:

3.1 Legal Requirements. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection and pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits shall be included. Whenever there is a conflict between Federal, State, or local laws, regulations, and permit requirements, the more restrictive provision shall apply.

3.2 Protection of Features. The Contractor shall prepare a listing of methods to protect resources needing preservation within authorized work areas. These include natural vegetation such as trees, shrubs, vines, grasses, and ground cover; landscape features; air and water quality; fish and

wildlife habitat; endangered species; and soil conservation, as well as historical, archeological, and cultural resources.

3.3 Environmental Protection Procedures. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations shall be included. The Contractor shall set out the procedures to be followed to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures set out in accordance with the Environmental Protection Plan.

3.4 Design Drawings. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, temporary fuel tanks, sanitary facilities, and stockpiles of excess or spoil materials shall be included.

3.5 Environmental Monitoring Management Plan. The Environmental Protection Plan shall include plans for monitoring environmental compliance for the jobsite, including land, water, air, noise, hazardous and toxic wastes, and materials and solid waste disposal.

3.6 Protection of Land Resources. Plan of protection for land resources as described in paragraph 7.1 of this specification shall be included.

3.7 Protection of Surface and Groundwater. Methods of protecting surface and groundwater during construction activities as described in paragraph 7.3 of this specification shall be included.

3.8 Protection of Air Resources. Methods for protecting air resources as described in paragraph 7.5 of this specification shall be included.

4. IMPLEMENTATION: The Contractor shall submit, in writing, the Environmental Protection Plan to the Contracting Officer's Representative within 10 days after receipt of Notice to Proceed. The Contracting Officer's Representative shall submit the plan to the PWBC Environmental/Natural Resources Division for approval. Approval of the Contractor's plan will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and other environmental protection measures.

5. SUBCONTRACTORS: Assurance that subcontractors comply with the environmental protection requirements of this section will be the responsibility of the prime Contractor.

6. NOTIFICATION: The Contracting Officer will notify the Contractor in writing of any observed noncompliance with the aforementioned Federal, State, or local laws or regulations, permits, and other elements of the Contractor's Environmental Protection Plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and implement such action as approved by the PWBC Environmental/Natural Resources Division. If the Contractor fails 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 time extensions shall be granted or costs or damages allowed to the Contractor for any such suspension.

7. PROTECTION OF ENVIRONMENTAL RESOURCES: The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications. Environmental protection shall be as stated in the following subparagraphs:

7.1 Protection of Land Resources. Prior to the start of any construction, the Contractor shall identify all land resources to be preserved within the Contractor's work area. The Contractor shall not remove, cut, deface, injure, or destroy land resources, including trees, shrubs, vines, grasses, topsoil, and land forms, without special permission from the Contracting Officer. No ropes, cables, or guys shall be fastened or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times.

7.1.1 Forest Resources. Merchantable timber and pine straw shall neither be cut nor removed from the construction site until it has been assessed by the Savannah District Timber Harvest Office in conjunction with PWBC Natural Resources Branch. The Savannah District Timber Harvest Office will be given adequate time to arrange for the sale and removal of timber and pine straw. In the event that the Savannah District and Natural Resources Branch determine the amount or quality of timber or pine straw is not merchantable, they will inform the Contracting Officer. The Contracting Officer will authorize the Contractor to remove forest resources which are in the footprint of construction.

7.1.2 Work Area Limits. Prior to any construction, the Contractor shall mark the areas that are not required to accomplish all work to be performed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments, installed monitoring wells, and markers shall be protected before construction operations begin. Where construction operations are to be conducted during darkness, the markers shall still remain visible. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects. Damage to protected areas/objects shall be repaired immediately by the Contractor at no additional cost to the Government.

7.1.2.1 Installation or removal of Underground Storage Tanks, oil/water separators, and Aboveground Storage Tanks. Prior to any installation/removal of underground storage tanks (USTs), the Contractor will contact the PWBC Environmental Compliance Branch (ECB) UST Program Manager and provide all UST installation/removal information. The PWBC ECB UST Program Manager will apply for all UST installation/removal and operating permits. Removal or demolition of oil/water separators must be coordinated through the PWBC ECB Installation Restoration Program (IRP) Manager prior to start of demolition. Strict sampling requirements exist for removals of these structures. All of Fort Bragg’s oil/water separators are included as a Solid Waste Management Unit under the IRP Program.

7.1.3 Protection of Landscape. Trees, shrubs, vines, grasses, land forms, and other landscape features indicated and defined on the drawings to be

preserved shall be clearly identified by marking, fencing, wrapping, or any other approved techniques.

7.1.4 Reduction of Exposure of Unprotected Erodible Soils. Earthwork brought to final grade shall be finished as indicated and specified. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in instances where the constructed feature obscures borrow areas, quarries, and waste material areas, these areas shall not initially be cleared in total. Clearing of such areas shall progress in reasonably sized increments as needed to use the areas as approved by the Contracting Officer.

7.1.4.1 Erosion and Sedimentation Control Plan. When the total area of land disturbed is 1 acre or more in size, an Erosion and Sedimentation Control Plan shall be prepared by the Contractor. The plan will be prepared in accordance with North Carolina Administrative Code, Title 15, Department of Natural and Economic Resources, Chapter 4, Sedimentation Control, January 1978. This plan is to be prepared, approved, and filed as part of the design prior to the start of any land-disturbing activity. When the area to be disturbed is less than 1 acre, a formal plan will not be required; however, erosion and sedimentation control measures will be incorporated as part of the design.

7.1.5 Temporary Protection of Disturbed Areas. Such methods as necessary shall be utilized to effectively prevent erosion and control sedimentation at all times including, but not limited to, the following:

7.1.5.1 Control of Runoff. Runoff from the construction site shall be controlled by construction of diversion ditches, benches, and silt basins; by checking dams and berms to reduce the velocity and divert runoff to protected drainage courses; and by any measures required by area-wide plans approved under paragraph 208 of the Clean Water Act.

7.1.5.2 Sediment Basins. Sediment from construction areas shall be trapped in temporary or permanent sediment basins in accordance with basin plans shown on the drawings. The basins shall accommodate the runoff of a local 5-year design storm. They shall be constructed as approved by the Contracting Officer to prevent sedimentation of downstream or downslope areas.

7.1.6 Disposal of Chemical Waste. The Contractor is responsible for the proper use, storage, and disposal of chemical material and waste in accordance with Fort Bragg Regulation 200-2. The PWBC Environmental/Natural Resources Division has established the following requirements in order for the post to remain in compliance with hazardous waste requirements as established by both State of North Carolina and Federal environmental laws:

7.1.6.1 Compatible Containers. Chemical waste shall be contained in and stored in aboveground compatible containers. Hazardous wastes shall not be stored underground. Any release or spill to the environment will be immediately reported to the Fort Bragg Fire Department at telephone (910) 396-7377/3015/1504 and to the PWBC Environmental/Natural Resources Division at telephone (910) 396-3341.

7.1.6.2 Recycling. The Contractor is encouraged to provide for recycling of waste through the Defense Reutilization and Marketing Office, Fort Bragg.

7.1.6.3 Chemical Analysis. The Contractor is responsible for obtaining chemical analyses of all chemical wastes. All chemical waste shall be disposed of in accordance with Fort Bragg's Waste Analysis Plan. Sampling of suspected hazardous waste is required to determine the hazardous waste characterization of the material. The Contractor is required to notify the contract inspector 1 day before the samples are taken. Samples shall be delivered by the contract inspector to the PWBC Environmental/Natural Resources Division for transmittal to an independent analytical laboratory. The laboratory shall be listed in the Environmental Protection Plan approved by the PWBC Environmental/Natural Resources Division.

7.1.6.4 Nonhazardous Waste. Waste that has been certified as nonhazardous waste may be removed off the project site by the Contractor. These wastes shall be disposed of in accordance with all applicable State of North Carolina requirements and U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) guidance. The Contractor shall address the disposal method and location of the disposal site for each chemical waste in the Environmental Protection Plan for the project.

7.1.6.5 Hazardous Waste. The Contractor may not normally remove hazardous waste from Fort Bragg. Removal shall be performed by a licensed hazardous waste firm. The hazardous waste contractor shall prepare the hazardous waste manifest form for signature by the Environmental/Natural Resources Division before each shipment of hazardous waste. Refer to Fort Bragg Regulation 200-2.

7.1.6.6 Labeling. Each container of hazardous waste shall be immediately labeled with a hazardous waste label and marked with the current date once any hazardous waste is put in the container. The Contractor shall keep the containers closed and inspect them weekly for signs of rust or deterioration. Inspection results shall be documented. Additionally, the U.S. Department of Transportation Shipping Name shall be marked on each container before it is removed from Fort Bragg. Refer to Fort Bragg Regulation 200-2.

7.1.6.7 Training. The Contractor shall ensure all of his employees who handle hazardous waste are trained in the management requirements for hazardous waste. Two hours of on-the-job training by the Environmental/Natural Resources Division will be scheduled for the first Wednesday of each month. All Contractor employees physically handling or managing waste media shall receive this training. Refer to Fort Bragg Regulation 200-2.

7.1.7 Disposal of Discarded Materials. Discarded materials, other than those which can be included in the solid waste category, will be handled as directed by the Contracting Officer. Construction and demolition debris shall be disposed of at the Fort Bragg Demolition Landfill on Lamont Road, and materials contaminated by asbestos or lead paint shall be contained and disposed of in the Asbestos Section of the Demolition Landfill. A permit from the PWBC Environmental/Natural Resources Division (building 3-1333) is required to dispose of materials in the landfills on post.

7.2 Preservation and Recovery of Historical, Archeological, and Cultural Resources. Existing historical, archeological, and cultural resources within the Contractor's work area will be designated by the Contracting Officer and precautions taken to preserve all significant resources as they existed at the time they were pointed out to the Contractor. The Contracting Officer's guidance shall be taken from the recommendations of the Cultural Resources Survey produced for the project area by the Savannah District, U.S. Army Corps of Engineers. The Contractor shall install all protection for resources designated on the drawings and shall be responsible for their preservation during this contract.

7.2.1 Artifacts Discovered During Construction. Any unforeseen historical or archeological finds encountered during Contractor operations shall be justification to cease all activity in the affected area. The PWBC Environmental/Natural Resources Division shall be promptly notified. They will determine the significance of the findings, if necessary, after consultation with the North Carolina State Historic Preservation Officer, prior to authorizing the Contractor to resume operations in that area.

7.2.2 Cultural Resources Protected by Law. Cultural resources on Federal property are protected and managed by the Archeological Resources Protection Act of 1979, and other applicable laws. Artifacts may be collected on Fort Bragg only after approval by the Savannah District and the PWBC Environmental/Natural Resources Office as part of a controlled research design for scientific and cultural purposes. Collection for personal use is not authorized. Conviction subjects the violator to civil and criminal penalties.

7.3 Protection of Water Resources. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Special management techniques shall be implemented to control water pollution by any construction activities which are included in performing this contract.

7.3.1 Monitoring of Environmental Damage. Monitoring of water courses and wetland affected by construction activities shall be the responsibility of the Contractor. Wetland is intolerant to disturbance and will require special design and management to prevent encroachment. During construction, action will be required to maintain buffer areas and soil erosion control measures near water areas which could be adversely affected by construction activities.

7.4 Protection of Wildlife and Wildlife Habitat. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of wildlife. Information concerning any species that require specific attention, along with measures for their protection, will be given by the PWBC Environmental/Natural Resources Division to the Contractor prior to start of construction operations.

7.4.1 Endangered Species Act. The Federal Endangered Species Act of 1973, as amended in 1982, requires that Federal lands be assessed for impacts upon endangered species and that such species be managed and protected. Although there are a number of rare, threatened, or endangered plant and animal species

on Fort Bragg which are listed by either the Federal or State government, the species most often of concern are an endangered bird, the red-cockaded woodpecker (RCW) (Picoides borealis) and two endangered plants, the rough-leaf loosestrife (RLLS) (Lysimachia asperulaefolia) and Michaux's Sumac (MS) (Rhus michauxii). Species proposed for listing under the provisions of the Federal Endangered Species Act are entitled to the same protection as those actually listed.

7.4.2 Red-Cockaded Woodpecker. The RCW is dependent upon large numbers of mature pine trees for its survival. The birds are not tolerant of disturbance. Their habitat is managed by the PWBC Environmental/Natural Resources Division, Endangered Species Branch. The habitat of the RCW is marked in the following manner: (1) Cavity trees which are used by the birds for roosting and nesting are marked with two broad bands of white paint; and (2) Each colony site is protected by a buffer area at least 200 feet in diameter around the cavity trees; trees on the edge of the buffer area are marked with a single broad band of white paint. Fixed activity such as storage of construction materials, operation of concrete batch plants, or parking vehicles is not authorized inside the buffer area. Molesting the birds or damaging their habitat is a violation of the Endangered Species Act. Conviction can subject the violator to severe civil and criminal penalties.

7.4.3 Endangered Plants. Endangered plants are dependent for their survival upon specific environmental conditions such as soil type, slope aspect, moisture, and light. They are not tolerant of disturbance. Their habitat is managed by the PWBC Environmental/Natural Resources Division, Endangered Species Branch. Each colony site is protected by a buffer area at least 200 feet in diameter. Trees on the edge of the buffer area are marked with a single broad band of white paint. Fixed activity such as storage of construction materials, operation of concrete batch plants, or parking vehicles is prohibited inside the buffer area. Damaging the habitat of endangered plants is a violation of the Endangered Species Act. Conviction can subject the violator to severe civil and criminal penalties.

7.5 Protection of Air Resources. The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources, to include all necessary permits for equipment and control equipment. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with all State of North Carolina (NCAC Title 15A Subchapter 2D and 2Q) and Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency (EPA) shall be maintained for all construction operations and activities. The Contractor shall have sufficient functional equipment available to accomplish the task.

7.5.1 Particulates. Dust particles, aerosols, and gaseous byproducts from all construction activities and the processing and preparation of materials, such as from asphaltic batch plants and abrasive blasting activities (NCAC 15A 2D.0541) shall be controlled at all times.

7.5.2 Odors. Odors shall be controlled at all times for all construction activities, processing, and preparation of materials.

7.5.3 Air Quality. Monitoring of air quality shall be the responsibility of the Contractor. All air areas affected by the construction activities shall be monitored by the Contractor when directed by the Contracting Officer.

7.6 Reduction of Sound Intrusions. The Contractor shall keep construction activities under surveillance and control to minimize disturbances caused by excessive noise. Equipment shall have properly operating noise-muffling devices for the entire length of the contract.

7.7 Application of Pesticides. The Contractor shall apply all pesticides in accordance with the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act, using pesticides approved by the EPA and following the instructions on the manufacturer's label. Application of termiticides during construction, if applicable, will be addressed in technical provision section 02315 - Excavation, Filling, and Backfilling for Buildings in Paragraph 16, Soil Treatment.

7.7.1 Licensing and Certification. All pesticide applications shall be performed by a Contractor certified in the EPA category or categories which cover the work to be performed and shall hold a valid business license. For work at Fort Bragg, the Contractor shall be certified and licensed by the State of North Carolina. The Contractor shall present evidence of such licensing and certification to the Contracting Officer for approval prior to award of the contract.

8. POST-CONSTRUCTION CLEANUP: The Contractor shall be responsible to clean up all areas affected by the construction and restore them back to at least their original condition to include landscaping; planting of trees, grass, and shrubs damaged by construction; and raking and disposal of debris such as roofing shingles, paper, nails, glass, sheet metal, bricks, and waste concrete. Backfilled areas shall be machine compacted and replanted with grass. Construction debris shall be removed and properly disposed of. Culverts and drainages with sediment from the construction area shall be cleared routinely to maintain proper drainage and recleaned prior to completion of the contract.

9. RESTORATION OF LANDSCAPE DAMAGE: The Contractor shall restore all landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be in accordance with the Environmental Protection Plan submitted for approval to the Contracting Officer. This work will be accomplished at the Contractor's expense.

10. MAINTENANCE OF POLLUTION CONTROL FACILITIES: The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for the length of time construction activities produce the particular pollutant.

10.1 Containment Berms. The Contractor shall build a containment berm around temporary aboveground fuel storage tanks. The bermed area shall be large enough to contain 125 percent of the volume of the storage tanks if

there is a leak. The Contractor shall not install any temporary underground storage tanks.

10.2 Erosion Control Devices. The Contractor shall immediately repair any damaged erosion control structures, such as silt fences, and remove accumulated sediment.

10.3 Storm Drains. The Contractor shall ensure sediment does not block storm drains. The Contractor shall be responsible for cleaning storm drains blocked due to erosion of sediment off site.

11. TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL: The Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities (vegetative covers and instruments required for monitoring purposes) to ensure adequate and continuous environmental pollution control. Such training shall be completed before contract work begins.

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SECTION 02300A

EARTHWORK

12/97

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SECTION 02300A

EARTHWORK
12/97

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	(1997) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457 mm (18-in) Drop
AASHTO T 224	(1996) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1140	(1997) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) 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

1.2 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

SELECTION OF BORROW MATERIAL; G.

Procedure and location for disposal of unused satisfactory material. Blasting plan when blasting is permitted. Proposed source of borrow material.

Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

SD-06 Test Reports

Testing; G.

Within 24 hours of conclusion of physical tests, 10 copies of test results, including calibration curves and results of calibration tests.

SD-07 Certificates

Testing; G.

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as SM, SC, SW, SP. Satisfactory materials for grading shall be comprised of stones less than 8 inches, except for fill material for pavements and railroads which shall be comprised of stones less than 3 inches in any dimension.

1.3.2 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.

1.3.3 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.

1.3.4 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.

1.3.5 Topsoil

Material suitable for topsoils obtained from offsite areas is defined as a sandy loam with a dark gray to grayish brown color and very friable, with a Minimum Organic Content of 1 percent, a pH of 4.5 to 6.0 and be taken from the top 12 inches of its site Location. A minimum of 2 inches of topsoil shall be provided.

1.4 CLASSIFICATION OF EXCAVATION

Excavation specified shall be done on a classified basis, in accordance with the following designations and classifications.

1.4.1 Rock Excavation

Rock excavation shall include blasting, excavating, grading, and disposing of material classified as rock and shall include the satisfactory removal and disposal of boulders 1/2 cubic yard or more in volume; solid rock; rock material that is in ledges, bedded deposits, and unstratified masses, which cannot be removed without systematic drilling and blasting; and firmly cemented conglomerate deposits possessing the characteristics of solid rock impossible to remove without systematic drilling and blasting. The removal of any concrete or masonry structures, except pavements, exceeding 1/2 cubic yard in volume that may be encountered in the work shall be included in this classification. If at any time during excavation, including excavation from borrow areas, the Contractor encounters material that may be classified as rock excavation, such material shall be uncovered and the Contracting Officer notified by the Contractor. The Contractor shall not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation and has taken cross sections as required. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for the areas of work in which such deposits occur.

1.4.2 Common Excavation

Common excavation shall include the satisfactory removal and disposal of all materials not classified as rock excavation.

1.5 BLASTING

Blasting will not be permitted.

1.6 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of in designated waste disposal or spoil areas. 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 in designated areas approved for surplus material storage or designated waste areas as directed. Newly designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. Coarse rock from excavations shall be stockpiled and used for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, topsoil shall be stripped to a depth of 6 inches. Topsoil shall be spread on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Any surplus of topsoil from excavations and grading shall be stockpiled in locations indicated.

3.2 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 the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Excavation of ditches, gutters, and channel changes shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Ditches and gutters shall not be excavated below grades shown. Excessive open ditch or gutter excavation shall be backfilled with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Material excavated shall be disposed of as shown or as directed, except that in no case shall material be deposited less than 4 feet from the edge of a ditch. The Contractor shall maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 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.

3.3 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the Fort Bragg Landfill borrow areas. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

3.4 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, borrow pits and other 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. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of

any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.5 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.

3.6 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and compacted as necessary to provide for safe operation of earth moving equipment. 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, and Section 02300A EARTHWORK. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.7 PREPARATION OF GROUND SURFACE FOR EMBANKMENTS

3.7.1 General Requirements

Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material; plowed, disked, or otherwise broken up to a depth of 18 inches; pulverized; moistened or aerated as necessary; and thoroughly mixed. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment materials to assure adequate bond between embankment material and the prepared ground surface.

3.7.2 Frozen Material

Embankment shall not be placed on a foundation which contains frozen material, or which has been subjected to freeze-thaw action. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrades (whether in an excavation or on an embankment) and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill. All material that freezes or has been subjected to freeze-thaw action during the construction work, or during periods of temporary shutdowns, such as, but not limited to, nights, holidays, weekends, winter shutdowns, or earthwork operations, shall be removed to a depth that is acceptable to the Contracting Officer and replaced with new material. Alternatively, the material will be thawed, dried, reworked, and recompacted to the specified criteria before additional material is placed. The Contracting Officer will determine when placement of fill shall cease due to cold weather. The Contracting Officer may elect to use average daily air temperatures, and/or physical observation of the soils for his determination. Embankment material shall not contain frozen clumps of soil, snow, or ice.

3.8 EMBANKMENTS

3.8.1 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 12 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 as necessary to provide for safe operation of earth moving equipment. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.8.2 Rock Embankments

Rock embankments shall be constructed from material classified as rock excavation, as defined above, placed in successive horizontal layers of loose material not more than 18 inches in depth. Pieces of rock larger than 9 inches in the greatest dimension shall not be used. Each layer of material shall be spread uniformly, completely saturated, and compacted. Each successive layer of material shall adequately bond to the material on which it is placed. Compaction shall be accomplished with vibratory compactors. Rock excavation shall not be used as fill material for the construction of pavements. In embankments on which pavements are to be constructed, rock shall not be used above a point 24 inch below the surface of the pavement.

3.9 SUBGRADE PREPARATION

3.9.1 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. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 1/2 inch when tested with a 10 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.

3.9.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.10 SHOULDER CONSTRUCTION

Shoulders shall be constructed of satisfactory excavated or borrow material or as otherwise shown or specified. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission of the Contracting Officer has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above, for specific ranges of depth below the surface of the shoulder. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section shown.

3.11 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. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

3.12 PLACING TOPSOIL

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly to a thickness of 4 inches and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from offsite areas.

3.13 TESTING

Testing shall be performed when requested by contracting officer, 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.

3.14 SUBGRADE AND EMBANKMENT PROTECTION

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.

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SECTION 02373

GEOTEXTILE

09/01

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SECTION 02373

GEOTEXTILE
09/01

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3786	(1987) Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method
ASTM D 4354	(1999) Sampling of Geosynthetics for Testing
ASTM D 4355	(1999) Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	(1986; R 2001) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4632	(1991; R 1997) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4759	(1988; R 1996) Determining the Specification Conformance of Geosynthetics
ASTM D 4833	(2000) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2001) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 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-07 Certificates

Geotextile G

A minimum of 14 days prior to scheduled use, manufacturer's certificate of compliance stating that the geotextile meets the requirements of this section. For needle punched geotextiles, the manufacturer shall also certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer.

1.3 DELIVERY, STORAGE AND HANDLING

Delivery, storage, and handling of geotextile shall be in accordance with ASTM D 4873.

1.3.1 Delivery

The Contracting Officer shall be notified a minimum of 24 hours prior to delivery and unloading of geotextile rolls. Rolls shall be packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, rolls shall be immediately rewrapped with the plastic wrapping. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Each roll shall be labeled with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

1.3.2 Storage

Rolls of geotextile shall be protected from construction equipment, chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, rolls shall either be elevated off the ground or placed on a sacrificial sheet of plastic in an area where water will not accumulate.

1.3.3 Handling

Geotextile rolls shall be handled and unloaded with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 RAW MATERIALS

2.1.1 Geotextile

Geotextile shall be a woven pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film

geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material shall not be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction. Values for AOS represent maximum average roll values.

TABLE 1
TYPICAL PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES (MARV)	TEST METHOD
GRAB STRENGTH	LBS	205	ASTM D 4632
PUNCTURE	LBS	110	ASTM D 4833
TRAPEZOID TEAR	LBS	85	ASTM D 4533
APPARENT OPENING SIZE	U.S. SIEVE	80	ASTM D 4751
PERMITTIVITY	SEC -1	1.50	ASTM D 4491
ULTRAVIOLET DEGRADATION	PERCENT	70%	ASTM D 4355
Grab Elongation		50%	ASTM D 4632
Mullen Burst		350 psi	ASTM D 3786
Wide Width Tensile		75 lb-in	ASTM D 4595
Permeability		0.38 cm/sec	ASTM D 4491
Water Flow Rate		110 gpm/ft2	ASTM D 4491

2.2 MANUFACTURING QUALITY CONTROL SAMPLING AND TESTING

The Manufacturer shall be responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request. Manufacturing quality control sampling and testing shall be performed in accordance with the manufacturer's approved quality control manual. As a minimum, geotextiles shall be randomly sampled for testing in accordance with ASTM D 4354, Procedure A. Acceptance of geotextile shall be in accordance with ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Subgrade Preparation

The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Subgrade materials and compaction requirements shall be met.

3.1.2 Placement

The Contractor shall notify the Contracting Officer a minimum of 24 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, the geotextile shall be laid with the machine direction of the fabric parallel to the slope direction.

3.2 SEAMS

3.3.1 Overlap Seams

Geotextile panels shall be continuously overlapped a minimum of 12 inches at all longitudinal and transverse joints. Where seams must be oriented across the slope, the upper panel shall be lapped over the lower panel. If approved, sewn seams may be used instead of overlapped seams.

3.3 PROTECTION

The geotextile shall be protected during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Adequate ballast (e.g. sand bags) shall be used to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

3.4 REPAIRS

Torn or damaged geotextile shall be repaired. Clogged areas of geotextile shall be removed. Repairs shall be performed by placing a patch of the same type of geotextile over the damaged area. The patch shall extend a minimum of 36 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. The machine direction of the patch shall be aligned with the machine direction of the geotextile being repaired. Geotextile rolls which cannot be repaired shall be removed and replaced. Repairs shall be performed at no additional cost to the Government

3.5 PENETRATIONS

Engineered penetrations of the geotextile shall be constructed by methods recommended by the geotextile manufacturer.

3.6 COVERING

Geotextile shall not be covered prior to inspection and approval by the Contracting Officer. Cover soil shall be placed in a manner that prevents

soil from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves. On side slopes, soil backfill shall be placed from the bottom of the slope upward. Cover soil shall not be dropped onto the geotextile from a height greater than 3 feet. No equipment shall be operated directly on top of the geotextile without approval of the Contracting Officer. Equipment with ground pressures less than 7 psi shall be used to place the first lift over the geotextile. A minimum of 12 inches of soil shall be maintained between full-scale construction equipment and the geotextile. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph. Rip Rap shall be dropped from a maximum height of 2 feet.

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SECTION 02630

STORM DRAINAGE

07/03

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SECTION 02630

STORM DRAINAGE
07/03

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 in the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 198	(2003) Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(2003) Manual for Railway Engineering

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 48/A 48M	(2000) Gray Iron Castings
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM A 929/A 929M	(2001) Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM B 26/B 26M	(2003) Aluminum-Alloy Sand Castings
ASTM C 139	(2003) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 270	(2003) Mortar for Unit Masonry
ASTM C 32	(1993; R 1999e1) Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 425	(2002) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(2002) Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 478	(2003) Precast Reinforced Concrete Manhole Sections
ASTM C 55	(2003) Concrete Brick

ASTM C 62	(2001) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 76	(2003) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 789	(2000) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM C 877	(2002) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
ASTM D 1557	(2002) 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 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3212	(1996a; R 2003) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

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

Placing Pipe

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-04 Samples

Pipe for Culverts and Storm Drains

Samples of the following materials, before work is started: G.

SD-07 Certificates

Resin Certification

Pipeline Testing
Hydrostatic Test on Watertight Joints
Determination of Density
Frame and Cover for Gratings

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

ASTM C 76, Class III.

2.2 DRAINAGE STRUCTURES

2.2.1 Flared End Sections

Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A 929/A 929M.

2.2.2 Precast Reinforced Concrete Box

Boxes subjected to highway loadings shall conform to ASTM C 789.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.2 Precast Concrete Segmental Blocks

Precast concrete segmental block shall conform to ASTM C 139, not more than 8 inches thick, not less than 8 inches long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

2.3.3 Brick

Brick shall conform to ASTM C 62, Grade SW; ASTM C 55, Grade S-I or S-II; or ASTM C 32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 1/2 inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

2.3.4 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure.

2.3.5 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48/A 48M, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

2.3.6 Joints

2.3.6.1 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877.

2.4 STEEL LADDER

Steel ladder shall be provided where the depth of the manhole exceeds 12 feet. These ladders shall 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 2-1/2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M.

2.5 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A 48/A 48M, Class 30B or 35B. Shape and size shall be as indicated.

2.6 EROSION CONTROL RIPRAP

Provide nonerodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of 8 inches.

2.6 HYDROSTATIC TEST ON WATERTIGHT JOINTS

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443. Test requirements for joints in clay pipe shall conform to ASTM C 425. Test requirements for joints in PVC and PE plastic pipe shall conform to ASTM D 3212.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 02300A EARTHWORK and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 24 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 02300A EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

3.3.1 Concrete, Clay, PVC, Ribbed PVC, Ductile Iron and Cast-Iron Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.3.2 Multiple Culverts

Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 3 feet apart, whichever is less.

3.3.3 Jacking Pipe Through Fills

Methods of operation and installation for jacking pipe through fills shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Manual.

3.4 JOINTING

3.4.1 Concrete and Clay Pipe

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 8 inches apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from the high

side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.1.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

3.4.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 1/2 inch, thick and the width of the diaper band shall be at least 8 inches. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.

3.4.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.7 External Sealing Band Joint for Noncircular Pipe

Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of precast reinforced concrete, complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 8 inches.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. 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 be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. 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.

3.8 FIELD PAINTING

After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

-- End of Section --

SECTION 02921B

EROSION CONTROL AND TURF SEEDING

DESCRIPTION OF WORK: This work shall consist of complete ground preparation and establishment of a permanent cover of grass on all open earth areas and all disturbed areas within the limits of construction. The work shall conform to this specification and shall be carefully coordinated with the site grading operations and erosion control work shown on the drawings and/or as covered in the specifications.

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.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS Seed Act	(1995) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 977	(1998) Emulsified Asphalt

STATE OF NORTH CAROLINA

North Carolina Seed Law
North Carolina Commercial Fertilizer Law
North Carolina Liming Materials and Landplaster Act
North Carolina Department of Transportation Standard Specifications for Roads and Structures, 1984 or Later Edition

1.2 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-07 Certificates

Seed; GA

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

SD-11 Closeout Submittals

Records and Test Data, Quality Control; FIO

1.3 OMITTED.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Omitted.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.3 Omitted.

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments shall be rejected. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants.

1.4.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with the AMS Seed Act and applicable state seed laws.

2.1.2 Permanent Seed Species, Mixtures and Rates of Application

Erosion Control Mix, March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Paspalum notatum	Pensacola Bahiagrass	50
Cynodon dactylon	Common Bermudagrass (hulled)	10
Lespedeza striata	Kobe Lespedeza	35
Setaria italica	German Millet	25

Erosion Control Mix, September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Paspalum notatum	Pensacola Bahiagrass	50
Cynodon dactylon	Common Bermudagrass (hulled)	5
Cynodon dactylon	Common Bermudagrass (unhulled)	5
Lespedeza striata	Kobe Lespedeza	35
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	25

Turf Mix, March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Cynodon dactylon	Common Bermudagrass (unhulled is acceptable, but not required)	100
Setaria italica	German Millet	25

Turf Mix, September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Cynodon dactylon	Common Bermudagrass (hulled)	50
Cynodon dactylon	Common Bermudagrass (unhulled)	50
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	25

2.1.3 Temporary Seed Species

Temporary seed species and rates for surface erosion control or turfed areas shall be as follows.

March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Setaria italica	German Millet	50

September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	50

2.1.4 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.1.5 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 OMITTED.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of lime and fertilizer meeting the following requirements.

2.3.1 Lime

Lime shall be agricultural grade, dolomitic limestone meeting requirements of the North Carolina Liming Materials and Landplaster Act and of ASTM C 602.

2.3.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and shall conform to applicable state regulations. Granular fertilizer shall conform to the North Carolina Commercial Fertilizer Law and shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 10 percent nitrogen, 20 percent phosphoric acid, and 20 percent potash. When slow release nitrogen forms are used in the fertilizer mixture, they shall be derived from sulfur-coated urea, urea formaldehyde, plastic or polymer-coated prills, or isobutylene diurea. Upon approval by the Contracting Officer, a different analysis of fertilizer may be used, provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.4.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.4.3 Wood Cellulose Fiber

Wood cellulose fiber mulch shall be used only in hydroseeding applications. It shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.4.4 Paper Fiber

Paper fiber mulch shall be used only in hydroseeding applications. It shall be recycled news print that is shredded for the purpose of mulching seed.

2.5 ASPHALT ADHESIVE

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1; or to North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures, grade CRS-1 or CRS-1H.

2.6 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

2.7 OMITTED.

2.8 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.8.1 Surface Erosion Control Straw or Excelsior Blanket

2.8.1.1 Straw Net Blanket

Straw blanket material manufactured for erosion control purposes. It shall be produced of 100% agriculture straw. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

2.8.1.2 Excelsior Blanket

Blanket shall be machine produced mat of wood excelsior formed from a web of interlocking wood fibers; covered on one side with either knitted straw blanket-like mat construction; covered with biodegradable plastic mesh; or interwoven biodegradable thread, plastic netting, or twisted kraft paper cord netting.

2.8.2 Surface Erosion Control Coconut Fiber Blanket

Coconut fiber erosion control blanket material manufactured for erosion control purposes. It shall be produced of 100% coconut fiber. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

2.8.3 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from March 1 through August 31 for summer establishment; and from September 1 through February 28 for winter establishment, in accordance with paragraph SEED.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.2 SITE PREPARATION

3.2.1 Finished Grade

The Contractor shall verify that finished grades are as indicated on drawings, and that smooth grading and compaction requirements have been completed prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying Lime

The application rate shall be 2000 pounds per acre. Lime shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The application rate shall be 400 pounds per acre. Fertilizer shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation. An additional 400 pounds per acre shall be applied after acceptance of permanent grass in accordance with paragraph POST-FERTILIZATION.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Existing dirt trails and open areas which are to be planted with pines shall be tilled for the top 12 inches. Lime and fertilizer may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Turf Area Debris

Debris and stones over a minimum 5/8 inch in any dimension shall be removed from the surface.

3.2.4.3 Erosion Control Area Debris

Debris and stones over a minimum 3 inches in any dimension shall be removed from the surface.

3.2.4.4 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be Broadcast Seeding, Drill Seeding, or Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be

used because of the difficulty in achieving even coverage, unless otherwise approved. If used, absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate shown in paragraph SEED, using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 1/4 inch depth by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.1.2 Drill Seeding

Seed shall be uniformly drilled to a maximum 1/2 inch depth and at the rate shown in paragraph SEED, using equipment having drills a maximum 7 inches distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

3.3.1.3 Rolling

The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rates shown in paragraph SEED. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified, or fertilizer may be applied separately in accordance with paragraph SITE PREPARATION. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Half of the wood cellulose or paper fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. The remaining half of the mulch and tackifier shall be mixed and applied in a second application. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

3.3.3 Mulching

3.3.3.1 Hay or Straw Mulch

Straw mulch shall be spread uniformly at the rate of 2 tons per acre. Hay mulch shall be spread uniformly at the rate of 3 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.3.3.3 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be sprayed at a rate between 10 to 13 gallons per 1000 square feet. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber or recycled paper fiber shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3.4 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

3.4.2 Temporary Seeding

Bare or disturbed areas that will be left over 15 days, or areas where directed during contract delays affecting the seeding operation, shall be seeded in accordance with temporary seed species and rates listed under paragraph SEED.

3.5 OMITTED

3.6 OMITTED

3.7 RESTORATION AND CLEAN UP

3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.7.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.9 SEED ESTABLISHMENT PERIOD

3.9.1 Quality Control

During construction, an established system of quality control shall be maintained. To assure compliance with contract requirements and the maintenance of records of all materials, equipment, and construction operations, quality control shall include but not be limited to the following:

Seeding -- Specified species planted at proper rates; preparation of planting bed as to thoroughness of tillage, leveling and depth of planting.

Mulching -- Types and rates of application.

Satisfactory stand of grass -- Coverage of the planted species at the end of the specified growth period, and the maintenance procedures, including supplemental fertilization.

A copy of all records and test data required herein, and the records of corrective action taken, shall be furnished the Contracting Officer.

3.9.2 Satisfactory Stand of Grass Plants, Turf or Erosion Control Area

A stand of turf is considered acceptable when the new growing sprouts of permanent grass are visible at the surface showing not less than 20 seedlings of permanent grass at least 2 inches long in each square foot, where no gaps larger than 4 inches in diameter occur anywhere in the seeded area, and where the total bare spots do not exceed 2 percent of the total seeded area. Permanent grass is defined as Common Bermuda or Pensacola Bahia.

3.9.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.9.3.1 Mowing

a. Turf Areas: Turf areas shall be mowed to a minimum 3 inch height when the turf is a maximum 4 inches high. Clippings shall be

removed when the amount cut prevents sunlight from reaching the ground surface.

b. Erosion Control Areas: Erosion control areas shall be mowed to a minimum 4 inch height when the plants are a maximum 8 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.9.3.2 Post-Fertilization

After the permanent grass has been accepted, and between the dates of April 15 and October 15, apply 400 pounds of fertilizer per acre.

3.9.3.3 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.3.4 Warranty

There is no 1 year warranty for maintenance after acceptance of grass.

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01005

GENERAL AND SPECIAL PROVISIONS

02/03

-- End of Section Table of Contents --

SECTION 01005

GENERAL AND SPECIAL PROVISIONS
02/03

1. SCOPE OF WORK: The work consists of furnishing all labor, equipment, transportation, and materials necessary to perform all work in strict accordance with these specifications, schedules, applicable PWBC Drawings, and other contract documents. The scope of work of this contract includes, but is not limited to, the following specific items of work:

1.1 Civil Work.

1.1.1 Construction of Sediment and Erosion Control Improvements.

1.1.2 Rehabilitation of soil grade, aggregate, pavement, and drainage.

1.1.3 Installation of permanent stabilization improvements.

1.2 Architectural Work. None.

1.3 Mechanical Work. None.

1.4 Electrical Work. None.

1.5 Landscaping and Grounds Restoration Work.

1.5.1 An necessary to complete 1.13.

2. PROJECT REQUIREMENTS:

2.1 Installation Regulations. The employees of the Contractor will be required to abide by all installation regulations as published by the Commanding Officer. A copy of these regulations can be obtained from the Area/Resident Engineer at the installation. All costs in connection therewith shall be included in the contract price for the work.

2.2 Bulletin Board. Immediately upon beginning of work, the Contractor shall provide a weatherproof, glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of the work the bulletin board shall be removed by and remain the property of the Contractor.

2.3 Time of Performance. All work shall be performed between 7:30 a.m. and 4 p.m. excluding official holidays, unless otherwise indicated or approved by the Contracting Officer. Requests to work during other than these normal hours shall be made in writing at least 36 hours in advance. For example, a request to work on a Saturday shall be submitted no later than Thursday at noon.

2.4 Certificates of Compliance and Material Submittals. The Contractor shall submit for approval all certificates of compliance and material submittals required in these technical provisions. Required submittals shall be submitted for approval not later than 30 days prior to the approval date needed to achieve compliance with the approved project schedule. Approval must be received from the Contracting Officer or his representative before incorporating the materials into the work. The Contractor shall provide a Submittal Register listing all required submittals in the contract to the COR at the time of the first submittal. Submittal forms (form 59-2-R) and a sample Submittal Register (Form 4288) will be provided at the Prework Conference.

2.5 Safety and Environmental Plans. The Contractor shall submit a proposed safety plan in accordance with the current Corps of Engineers Safety Manual, EM 385-1-1, and shall submit an environmental protection plan in accordance with specifications section 02013, Environmental Protection During Construction, if included in these technical provisions. A sample safety plan form will be provided at the Prework Conference.

2.6 Quality Control. The Contractor shall provide the job superintendent's name and telephone number to the Construction Management Division of the PWBC; building 3-1933, Butner Road; (910) 396-2308, prior to commencement of work. The Contractor shall furnish a daily Contractor Quality Control (CQC)/Superintendent's work report to the Contracting Officer's Representative (COR). A sample CQC report form will be provided at the Prework Conference.

2.7 Excavation Permit. The Contractor shall have a completed and approved PWBC Excavation Permit in his possession prior to any excavation, to include sign or fence-post holes. The Contractor shall schedule an appointment to locate utility lines at least 24 hours prior to any excavation with the PWBC Facilities Maintenance Division; building 3-1634, Butner Road; (910) 396-2772. A copy of the PWBC Excavation Permit will be provided at the Prework Conference. The Contractor shall also be responsible for coordination with the Information Technology Business Center (ITBC), Outside Plant Branch; building 1-1434, Scott Street; (910) 396-8200, for locating communication lines prior to any excavation.

2.8 Disposal and Borrow Permits.

2.8.1 Disposal Permits. A permit is required to use the installation land clearing and inert debris and demolition landfills. Landfill permits shall be processed with the Environmental Compliance Branch of the PWBC Environmental & Natural Resources Division; building 3-1933, Butner Road; (910)396-3372/3341. Permits are issued for the life of the specific contract only. Only materials produced on the project for which the permits are issued may be disposed of in the land clearing and inert debris and demolition landfills. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract disposal operation. Copies of the disposal permit forms will be provided at the Prework Conference. The land clearing and inert debris and demolition debris disposal site locations are shown on the drawings.

2.8.2 Borrow Permits. A permit is required to use the Fort Bragg borrow material pits. Borrow pit permits shall be processed with the Environmental Compliance Branch of the PWBC Environmental & Natural Resources Division; building 3-1933, Butner Road; (910)396-3372/3341. Permits are issued for the life of the specific contract only. Borrow materials may only be used on the project for which the permits are issued. The Contractor shall keep a copy

of the completed permit with the vehicle throughout the contract borrow operation. Copies of the borrow permit forms will be provided at the Prework Conference. The borrow pit location is shown on the drawings.

2.9 Haul Routes. The Contractor is required to use the haul routes shown on the contract drawings for transportation of borrow materials, construction debris, or demolition materials unless otherwise permitted in writing by the COR. When haul routes are not designated in the contract, the Contractor must obtain approval from the COR for the routes he intends to use. The axle load of earth-hauling equipment operating on paved streets shall not exceed 12,000 pounds.

2.10 Utility Outages and Road Closures. Utility, road, and railroad closures require minimum 10 working days advance written notice and will be subject to COR approval. A sample utility outage/road closure request form will be provided at the Prework Conference. In the case of road closures, a sketch shall be provided showing the closure location and all necessary signs and barricades. Necessary signage, barricades, flagpersons, lights (including temporary traffic control lights), and markings for the safe movement of the public during construction shall be in accordance with the Manual on Uniform Traffic Control Devices, and shall be provided at no additional expense to the Government.

2.11 AVAILABILITY AND USE OF UTILITY SERVICES.

2.11.1 Payment for Utility Services
The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to and paid for by the Contractor at the prevailing rates. The rates listed below are current as of [insert date] and are subject to change. The Contractor shall carefully conserve all utilities furnished.

2.11.2 Meters and Temporary Connections
The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections, distribution lines, and meters required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall notify the Contracting Officer's Representative, in writing, 10 working days before the temporary connection is made so that a utilities contract can be established. The Contracting Officers Representative will then provide the contractor with the name and phone number of who to contact for setting up the utility contract. For temporary electrical connections the Government or applicable utility provider will provide the meter (meter base provided by contractor) and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor shall not make the final electrical connection. For temporary water and sewer connections the contractor will provide the meter and after inspection/approval by the Contracting Officer's Representative make the final connection at the contractor's expense.

2.11.3 Use of Permanent Building Utility Connections
Utilities consumed by the contractor from permanent building utility connections shall also be metered and paid for by the contractor. When the permanent system is activated the initial meter reading shall be recorded and reported as specified below. On building renovation projects the initial meter reading shall be recorded when the contractor is given possession of the building to perform the work. The contractor shall pay for utilities consumed through the permanent building connection until the work has been

completed or the government has occupied the facility, which ever occurs first.

2.11.4 Advance Deposit
An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

2.11.5 Initial Meter Readings
Upon installation of the meter, the initial reading shall be recorded (in the presence of the Contracting Officer's Representative) and forwarded to the point of contact for utility service with a copy to the Contracting Officer's Representative.

2.11.6 Final Meter Reading
Before completion of the work and final acceptance of the work by the Government, the Contractor shall notify the Contracting Officer and the applicable utility provider, in writing, 10 working days before termination is desired. The Government or applicable utility provider will take a final meter reading. Electric service will be disconnected by the provider. Water and sewer connections will be disconnected by the contractor, at his expenses and by a method approved by the Contracting Officer's Representative. The Contractor shall then remove all the temporary distribution lines, meters, meter bases, and associated paraphernalia. The Contractor shall pay all outstanding utility bills before final acceptance of the work by the Government.

2.11.7 Requirement for backflow prevention on temporary/permanent potable water connections.
The contractor shall install a backflow prevention device on all connections to the potable water system. The backflow prevention device shall be a reduced pressure or double check type, meeting all the State code requirements for backflow preventers on potable water. If the contractor request the use of a fire hydrant and receives approval from the Contracting Officer's Representative a backflow prevention device and meter shall be installed prior to each use.

2.11.8 Utilities Charge Rates
Water ---------- $1.70 per 1,000 gallons
Electricity ------ $0.0657 per KW hour
Sewer ---------- $10.00/month for each connected trailer up to single wide size.
The rate for larger trailers will be determined by the utility provider, however, this rate will not exceed $20.00/month per trailer.

2.12 As-Built Record Drawings. The Contractor shall be responsible for maintaining one set of master prints at the job-site on which he shall keep a careful and neat record of all deviations from the original contract drawings as the work progresses. The Contractor shall note all changes and corrections on these record drawings promptly as the changes occur, but in no case less often than a weekly basis. In addition to incorporated modifications, these record drawings shall also include the actual location of all subsurface utility lines installed or encountered, and the type of materials used. The marked-up/annotated prints, or the annotated electronic drawings if applicable, shall be certified as to their correctness by an

authorized representative of the Contractor and turned-over to the COR not later than 10 days after acceptance of the work by the Government.

2.13 Contractor Storage Areas.

2.13.1 Contractor Storage Area Compound. The contractor storage area compound, (see sheet 2 of plans for location) has areas for construction trailers and storage of materials. Utilities are available. If the Contractor chooses to use the compound, he/she must sign a statement agreeing to the rules and guidelines governing the compound. Copies are available on request.

2.13.2 Restoration of Storage Areas. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

2.14 Project Sign. The Contractor shall furnish and install a project sign at the location selected by the Contracting Officer. The project sign shall be painted on 1/2 inch thick exterior grade plywood. The sign layout shall be in accordance with the graphic format shown in Attachment 1 of Section 00800 at the end of this section." Make sure the correct title is given--we don't want to see "Misc. Repairs", etc.

1.15 Color Boards. Omitted.

2.16 Construction Debris Leaving Site. All construction debris/trash that leaves the project site will be covered from the time that it leaves the construction site. Any mud or soil which leaves the project site will be cleaned up by the Contractor immediately upon discovery or notification of such an occurrence.

2.17 Protection. Contractor is responsible to provide such covering, shields and barricades as are required to protect building occupants, equipment, stores, supplies, etc., from dust, debris, weather intrusion, water, moisture or other cause of damage resulting from construction.

2.18 Replacement. The Contractor shall be held responsible for the replacement of any utility systems, facilities, or Government equipment damaged during the course of the contract.

2.19 Cleanup. Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

2.20 Sanitation. The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

3. SPECIAL PROVISIONS:

3.1 Occupancy. The facility will be unoccupied during accomplishment of the work. The Contractor shall provide not less than 10 days prior notice to the COR to allow evacuation of the affected area(s). Interference with and inconvenience to the occupants or routine use of the facility shall be held

to an absolute minimum. The Contractor is responsible for providing such covering, shields, and barricades as are required to protect the facility occupants, furniture, equipment, supplies, etc., from dust, debris, weather intrusion, or other cause of damage resulting from construction.

3.2 Contractor Vehicle/Equipment Access to Fort Bragg. Fort Bragg is a closed installation, and vehicular access is controlled. Contractors are required to register each vehicle that will be traveling installation roads or streets under its own power. Each such vehicle shall have a registration decal. Registration may be accomplished at the Main Vehicle Registration Center, building 8-1078 on Randolph Street near Bragg Boulevard, 0800-1700 hours Monday through Friday. Unregistered vehicles should expect be stopped and delayed at all access control points. Contractors and all commercially registered vehicles shall use the Knox Street access control point off Bragg Boulevard for all access to Fort Bragg.

3.3 Special Access Requirements.

3.3.1 NC DENR-Land Resources, Mr. Steve Cock, CPESC for inspection of erosion control measures (910-486-1541).

3.3.2 PWBC ENRD Soil Conservationist notification prior to any land disturbing activities after construction limits have been staked and perimeters of trees to be removed are flagged by the Contractor (910-396-7506, ext 136).

3.3.3 Contractor shall ensure complete passage during evening hours. Full obstruction during daylight hours is acceptable with coordination with Range Control.

3.4 Special Work Constraints.

3.4.Sediment and Erosion Control Measures.

3.4.1.1 Earth Disturbance activities of project.

3.4.1.2 Establishment of permanent erosion control measures.

3.4.3 Special Access Requirements.

3.4.4 Special Coordination Requirements.

3.4.4.1 Contractor shall coordinate with Range Control the construction schedule and set up a UXO Briefly by EOD Personnel.

3.4.4.2 Prior to ground disturbance and subsequent to staking the proposed grading, Contractor must contact cultural resources at (910) 396-6680 for archaeological site confirmation.

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MEASUREMENT AND PAYMENT
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PART 1 GENERAL

1.1 LUMP SUM PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1.1 Mobilization and Demobilization

1.1.1.1 Payment

Payment will be made for costs associated with mobilization and demobilization, as defined in Special Clause PAYMENT FOR MOBILIZATION AND DEMOBILIZATION.

1.1.1.2 Unit of Measure

Unit of measure: lump sum.

1.1.2 Site Improvements

Rain Barrel connections, wood rail fence and cable fence, pervious pavers, walls, grading, utility adjustments necessary, drain inlets, drain piping, erosion control seeding, demolition and tree removal.

1.1.2.1 Payment

Payment will be made for costs associated with operations necessary for construction of the structure.

1.1.2.2 Unit of Measure

Unit of measure: lump sum.

1.1.3 Landscape Plantings

Mulch, plants, plant installation, blended organic soil, and plant relocation.

1.1.3.1 Unit of Measure

Unit of measure: lump sum.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11	(1995) Progress, Schedules, and Network Analysis Systems

1.2 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS, a Project Schedule as described below shall be prepared. The scheduling of constructiondesign and construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliersDesigners, Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.2 BASIS FOR PAYMENT

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule or scheduling personnel will result in an inability of the Contracting Officer to evaluate Contractor's progress for the purposes of payment. Failure of the Contractor to provide all information, as specified below, shall result in the disapproval of the entire Project Schedule submission and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. In the case where Project Schedule revisions have been directed by the Contracting Officer and those revisions have not been included in the Project Schedule, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until revisions to the Project Schedule have been made.

3.3 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer.

3.3.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in the Precedence Diagram Method (PDM).

3.3.2 Level of Detail Required

The Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the Contracting Officer at the appropriate level of detail, as specified by the Contracting Officer, shall result in the disapproval of the schedule. The Contracting Officer will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule:

3.3.2.1 Activity Durations

Contractor submissions shall follow the direction of the Contracting Officer regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods (usually less than 2 percent of all non-procurement activities' Original Durations are greater than 20 days).

3.3.2.2 Design and Permit Activities

Design and permitting activities, including necessary conferences and follow-up actions and design package submission dates, shall be integrated into the schedule.

3.3.2.3 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, and delivery.

3.3.2.4 Critical Activities

The following activities shall be listed as separate line activities on the Contractor's project schedule:

a. Submission and approval of as-built drawings.

b. Correction of punchlist from prefinal inspection.

c. Final inspection.

3.3.2.5 Government Activities

Government and other agency activities that could impact progress shall be shown. These activities include, but are not limited to: approvals, approvals, design reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.2.6 Responsibility

All activities shall be identified in the project schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the subcontracting firm, contractor work force, 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 the Responsibility Code.

3.3.2.7 Work Areas

All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

3.3.2.8 Modification or Claim Number

Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number. Whenever possible, changes shall be added to the schedule by adding new activities. Existing activities shall not normally be changed to reflect modifications.

3.3.2.9 Bid Item

All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

3.3.2.10 Phase of Work

All activities shall be identified in the project schedule by the phases of work in which the activity occurs. Activities shall not contain work in more than one phase of work. The project phase of each activity shall be by the unique Phase of Work Code.

3.3.2.11 Category of Work

All Activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited, to the procurement chain of activities including such items as submittalsdesigns, design package submissions design reviews, review conferences, permits, submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

3.3.2.12 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to, a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

3.3.3 Scheduled Project Completion

The schedule interval shall extend from NTP to the contract completion date.

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

3.3.3.3 Early Project Completion

In the event the project schedule shows completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted in the narrative report at every project schedule update period to assist the Contracting Officer in evaluating the Contractor's ability to actually complete prior to the contract period.

3.3.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

3.3.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

The Contractor shall include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the

completion date for the project, and a zero day duration.

3.3.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Program features which calculate one of these parameters from the other shall be disabled.

3.3.6 Out-of-Sequence Progress

Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case approval of the Contracting Officer. The Contractor shall propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule.

3.3.7 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 60 calendar days shall be submitted for approval within 20 calendar days after the NTP is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after NTP.

3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 40 calendar days after NTP. The schedule shall provide a reasonable sequence of activities which represent work through the entire project and shall be at a reasonable level of detail.

3.4.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Standard Activity Coding Dictionary

The Contractor shall use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used.

3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the preliminary submission, initial submission, and every periodic project schedule update throughout the life of the project:

3.5.1 Data Disks

Two data disks containing the project schedule shall be provided. Data on the disks shall adhere to the SDEF format specified in ER 1-1-11, Appendix A.

3.5.1.1 File Medium

Required data shall be submitted on 3.5 disks, formatted to hold 1.44 MB of data, under the MS-DOS Version 5. or 6.x, unless otherwise approved by the Contracting Officer.

3.5.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Preliminary, Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the MS-DOS version used to format the disk.

3.5.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the Contracting Officer for approval.

3.5.2 Narrative Report

A Narrative Report shall be provided with the preliminary, initial, and each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths, a description of current and anticipated problem areas or delaying

factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to relay to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis.

3.5.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number.

3.5.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number. Preceeding and succeeding activities shall include all information listed above in paragraph Schedule Reports. A blank line shall be left between each activity grouping.

3.5.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.

3.5.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the NTP until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and Contracting Officer at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; and complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.5.5 Network Diagram

The network diagram shall be required on the initial schedule submission

and on monthly schedule update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity number, description, duration, and estimated earned value shall be shown on the diagram.

3.5.5.2 Project Milestone Dates

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

3.5.5.3 Critical Path

The critical path shall be clearly shown.

3.5.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly onsite meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The Contracting Officer will approve activity progress, proposed revisions, and adjustments as appropriate.

3.6.1 Meeting Attendance

The Contractor's Project Manager and Scheduler shall attend the regular progress meeting.

3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

3.6.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost-to-Date shall be subject to the approval of the Contracting Officer. As a minimum, the Contractor shall address the following items on an activity by activity basis during each progress

meeting.

3.6.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed .

3.6.3.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations shall be based on Remaining Duration for each activity.

3.6.3.3 Cost Completion

The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

3.6.3.4 Logic Changes

All logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

3.6.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule which does not represent the actual or planned prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, or any interim milestone date, the Contractor shall furnish the following for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

3.7.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, will not be a cause for a time extension to the contract completion date.

3.7.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number.

b. A brief explanation of the causes of the change.

c. An analysis of the overall impact of the changes proposed.

d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

3.7.3 Additional Submission Requirements

For any requested time extension of over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's request.

3.8 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, the Contractor shall advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 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.

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SECTION 01330

SUBMITTAL PROCEDURES
05/02

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Government-Furnished Information

Submittal register [database and submittal management program] will be delivered to the contractor, by contracting officer [on 3 1/2 inch disk]. 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.]

1.2 DEFINITIONS

1.2.1 Submittal

Shop drawings, product data, samples, operation and maintenance data,and administrative submittals presented for review and approval. 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."

1.2.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.

b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

d. Operation and Maintenance (O&M) Data:
Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item. The data is required when the item is delivered to the project site.

e. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.3 SUBMITTAL IDENTIFICATION (SD)

Submittals required 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 values.
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 or equipment for some portion of the work.

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

SD-04 Samples

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

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 checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements 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 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.

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-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

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

1.3.1 Approving Authority

Person authorized to approve submittal.

1.3.2 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.

1.4 SUBMITTALS

Submit the following in accordance with the requirements of this section.

SD-01 Preconstruction Submittals

Submittal register; G

1.5 USE OF SUBMITTAL REGISTER [DATABASE]

Prepare and maintain submittal register, as the work progresses.[Use electronic submittal register program furnished by the Government or any other format.] 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.

1.5.1 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, "Quality Control" and [Section 01321N, "Network Analysis Schedules."] [Section 01320N, "Construction Progress Documentation."] Do not change data in columns (c), (d), (e), and (f) as delivered by the government. 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.

1.5.2 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.

1.5.3 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.

1.5.4 Contractor Action Code and Action Code

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

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.5.5 Copies Delivered to the Government

Deliver one copy of submitted register updated by contractor to government with each invoice request. [Deliver in electronic format, unless a paper copy is requested by contracting officer.]

1.6 PROCEDURES FOR SUBMITTALS

1.6.1 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.

1.6.2 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.

1.6.3 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.

1.6.4 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.

1.6.4.1 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).

1.6.4.2 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.

1.6.4.3 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.

1.6.4.4 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.

1.6.5 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.

1.6.6 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 [_____], 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 [_____], 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.

1.6.7 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.

1.6.8 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.

1.7 FORMAT OF SUBMITTALS

1.7.1 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.

1.7.2 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.

1.7.3 Format for 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.

1.7.4 Format of Product Data

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.

1.7.5 Format of 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.

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.7.6 Format of Operation and Maintenance (O&M) Data

a. O&M Data format shall comply with the requirements specified in Section 01781, Operation and Maintenance Data"

1.7.7 Format of Administrative 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.

1.8 QUANTITY OF SUBMITTALS

1.8.1 Number of Copies of 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. 1.8.2 Number of Copies of Product Data

Submit product data in compliance with quantity requirements specified for shop drawings.

1.8.3 Number of 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.

1.9 FORWARDING SUBMITTALS

1.9.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward 5, submittals required in the technical sections of this specification, including shop drawings, product data and samples. One copy of the transmittal form for all submittals shall be forwarded to the Resident Officer in Charge of Construction.

1.10 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.10.1 Government Approved

Government approval is required for extensions of design, critical

materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer.

Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.10.2 Information Only

All submittals not requiring Government approval will be for information only.All submittals not requiring Designer of Record or Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above. All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.11 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for [dimensions, the design of adequate connections and details, and the satisfactory construction of all work][design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work.] . After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.12 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal.The Contractor shall make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal shall be resubmitted as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.13 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or

deviations from the Solicitation or Accepted Proposal.

1.14 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System ManagerQuality Control (CQC) System Manager and the Designer of Record, if applicable, and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.15 SUBMITTAL REGISTER

At the end of this section is a submittal list showing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. The Contractor shall maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall track all submittals.

1.16 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 10 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

1.17 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.18 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.18.1 Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

1.18.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.19 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.20 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. One copies of the submittal will be retained by the Contracting Officer and one copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.21 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe..

1.22 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR (Firm Name)   _____ Approved _____ Approved with corrections as noted on submittal data and/or attached sheets(s).   SIGNATURE: _____ TITLE: _____ DATE: _____

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Storm Drainage Repair

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01330	SD-01 Preconstruction Submittals														
			Submittal register	1.5.1	G												
		01355A	SD-01 Preconstruction Submittals														
			Environmental Protection Plan	1.7	G												
		01356A	SD-07 Certificates														
			Mill Certificate or Affidavit	2.1.3	G												
		01780A	SD-02 Shop Drawings														
			As-Built Drawings	1.2.1	G												
			SD-03 Product Data														
			As-Built Record of Equipment and		G												
			Materials														
			Final Cleaning		G												
		02231	SD-03 Product Data														
			Materials Other Than Salable		G												
			Timber														
			SD-04 Samples														
			Tree wound paint	2.1													
			Herbicide	2.2													
		02300A	SD-03 Product Data														
			Earthwork		G												
			SD-06 Test Reports														
			Testing	3.13	G												
			SD-07 Certificates														
			Testing	3.13	G												
		02370A	SD-02 Shop Drawings														
			Layout	3.2.2	G												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Storm Drainage Repair

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02370A	Obstructions Below Ground	3.2.4	G													
			Erosion Control	3.2.2	G													
			Seed Establishment Period		G													
			Maintenance Record	3.6	G													
			SD-03 Product Data															
			Geosynthetic Binders	2.2.2	G													
			Hydraulic Mulch	2.3.10	G													
			Geotextile Fabrics	2.4	G													
			Synthetic Grid Systems		G													
			Equipment	1.4														
			Finished Grade	3.1.1	G													
			SD-04 Samples															
			Materials	1.5	G													
			SD-07 Certificates															
			Erosion Control Plan	3.1	G													
			Construction Work Sequence	3.1	G													
			Schedule															
			Installer's Qualification	1.7	G													
			Seed		G													
		02373	SD-03 Product Data															
			Thread	2.1.2	G													
			Manufacturing Quality Control		G													
			Manual Sampling and Testing															
			SD-04 Samples															
			Quality Assurance Samples and	3.1	G													
			Tests															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Storm Drainage Repair

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02373	SD-07 Certificates															
			Geotextile	2.1.1	G													
		02620A	SD-04 Samples															
			Filter Fabric	2.2	G													
			Pipe for Subdrains	2.1														
			SD-07 Certificates															
			Filter Fabric	2.2	G													
			Pipe for Subdrains	2.1	G													
		02714A	SD-03 Product Data															
			Waybills and Delivery Tickets															
			SD-06 Test Reports															
			Sampling and Testing	1.8	G	G												
			Approval of Materials	1.8.6	G													
		02780	SD-04 Samples															
			Concrete Paving Block	2.1.2	G													
			SD-06 Test Reports															
			Tests, Inspections and	2.2	G													
			Verifications															
		02821A	SD-07 Certificates															
			Wood Posts	2.1	G													
		02915A	SD-02 Shop Drawings															
			Finished Grade and Topsoil	3.2.1	G													
			Underground Utilities	3.1.4	G													
			Delivered Topsoil	1.6.1	G													
			Obstructions Below Ground	3.3.1	G													
			SD-03 Product Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Storm Drainage Repair

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02915A	Polymers															
			Root Barriers	3.4.2	G													
			Transplanting Plan	1.3	G													
		02930A	SD-02 Shop Drawings															
			Shop Drawings	3.3.1	G													
			Finished Grade, Topsoil and	3.2.1	G													
			Underground Utilities															
			SD-03 Product Data															
			Geotextile	2.5	G													
			Chemical Treatment Material	1.4.3.2														
			Plant Establishment Period	3.9	G													
			SD-04 Samples															
			Mulch	2.4	G													
			Geotextile	2.5	G													

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SECTION 01355A

ENVIRONMENTAL PROTECTION
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 in the text by basic designation only.

U.S. AIR FORCE (USAF)

AFI 32-1053	Pest Management Program

U.S. ARMY (DA)

AR 200-5	Pest Management

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

33 CFR 328	Definitions
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171 - 178	Hazardous Materials Regulations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) U.S. Army Corps on Engineers Safety and Health Requirements Manual
WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is 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 humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners,excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Installation Pest Management Coordinator

Installation Pest Management Coordinator (IPMC) is the individual officially designated by the Installation Commander to oversee the Installation Pest Management Program and the Installation Pest Management Plan.

1.2.4 Project Pesticide Coordinator

The Project Pesticide Coordinator (PPC) is an individual that resides at a Civil Works Project office and that is responsible for oversight of pesticide application on Project grounds.

1.2.5 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor shall discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" shall occur. Land Application shall be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.6 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.7 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.8 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers,creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.9 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.10 Wetlands

Wetlands means 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, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLAND MANUAL.

1.3 GENERAL REQUIREMENTS

The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

1.4 SUBCONTRACTORS

The Contractor shall ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. The Contractor shall be responsible for payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor. All costs associated with this section shall be included in the contract price. The Contractor shall be responsible for payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations.

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-01 Preconstruction Submittals

Environmental Protection Plan; G

The environmental protection plan.

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the Contractor shall submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The Contractor shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the Contractor considers necessary, shall be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, the Contractor shall meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan shall be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

The environmental protection plan shall include, but shall not be limited to, the following:

a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.

c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

d. Description of the Contractor's environmental protection personnel training program.

e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan shall include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. The Spill Control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

1. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer and [the local Fire Department] [Facility Fire Department] [Facility Response Personnel] [Facility Environmental Office] in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.

2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

3. Training requirements for Contractor's personnel and methods of accomplishing the training.

4. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

5. The names and locations of suppliers of containment materials

and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

6. The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. The plan shall include schedules for disposal. The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste. Licenses or permits shall be submitted for solid waste disposal sites that are not a commercial operating facility. Evidence of the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction. The Contractor shall attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. The report shall be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and shall be for the previous quarter (e.g. the first working day of January, April, July, and October). The report shall indicate the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

l. A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. The plan shall detail the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

m. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

n. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time shall be included in the contaminant prevention plan. As new hazardous materials are brought on site or removed from the site, the plan shall be updated.

o. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan shall include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan shall include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, a copy of the permit and associated documents shall be included as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan shall include

documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

p. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. The plan shall include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Contracting Officer.

q. A pesticide treatment plan shall be included and updated, as information becomes available. The plan shall include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation Project Office specific requirements. The Contractor shall follow [AR 200-5 Pest Management, Chapter 2, Section III "Pest Management Records and Reports" for data required to be reported to the Installation] [AFI 32-1053 Sections 3.4.13 and 3.4.14 for data required to be reported to the Installation].

1.7.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached,as an appendix, to the Environmental Protection Plan.

1.8 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report shall be signed by both the the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor shall protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

1.9 SPECIAL ENVIRONMENTAL REQUIREMENTS

The Contractor shall comply with the special environmental requirements listed here and included at the end of this section.

1.10 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings,plans and specifications which may have an environmental impact will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.11 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 LAND RESOURCES

The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Contractor.

3.1.1 Work Area Limits

Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.1.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features

indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.1.3 Erosion and Sediment Controls

The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs) [as indicated on the drawings] [as specified in Section 01356 STORM WATER POLLUTION PREVENTION MEASURES]. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. [The Contractor's best management practices shall also be in accordance with the National Pollutant Discharge Elimination System (NPDES) Storm Water Pollution Prevention Plan (SWPPP) which may be reviewed at the Environmental Office.] Any temporary measures shall be removed after the area has been stabilized.

3.1.4 Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

3.2 WATER RESOURCES

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the Contractor. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.2.1 Wetlands

The Contractor shall not enter, disturb, destroy, or allow discharge of contaminants into any wetlands except as authorized herein. The Contractor shall be responsible for the protection of wetlands shown on the drawings in accordance with paragraph ENVIRONMENTAL PERMITS, REVIEWS, AND APPROVALS. Authorization to enter specific wetlands identified shall not relieve the Contractor from any obligation to protect other wetlands within, adjacent to, or in the vicinity of the construction site and associated boundaries.

3.3 AIR RESOURCES

Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and performance laws and standards.

3.3.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The Contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The Contractor shall comply with all State and local visibility regulations.

3.3.2 Odors

Odors from construction activities shall be controlled at all times. The odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.3.3 Burning

Burning shall be prohibited on the Government premises.

3.4 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

3.4.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. Waste materials shall be hauled to the Government landfill site shown on the drawings. The Contractor shall comply with site procedures pertaining to the use of landfill areas.]

3.4.2 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262 [and shall manage and store hazardous waste in accordance with the [Installation] [Project Office] hazardous waste management plan]. The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a

safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations. The Contractor shall transport Contractor generated hazardous waste off Government property within 60 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer[and the Facility Environmental Office]. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. [The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.] [The Contractor shall coordinate the disposition of hazardous waste with the [Facility's] [Project Office's] Hazardous Waste Manager and the Contracting Officer.]

3.4.3 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. There shall be no storage of fuel on the project site. Fuel must be brought to the project site each day that work is performed.

3.5 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

[Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. The Contractor shall protect these resources and shall be responsible for their preservation during the life of the Contract.]If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.6 BIOLOGICAL RESOURCES

The Contractor shall minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.7 INTEGRATED PEST MANAGEMENT

3.7.1 Pesticide Delivery and Storage

Pesticides shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses. Pesticides shall be stored according to manufacturer's instructions and under lock and key when unattended.

3.7.2 Qualifications

For the application of pesticides, the Contractor shall use the services of a subcontractor whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

3.7.3 Pesticide Handling Requirements

The Contractor shall formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions and shall use the clothing and personal protective equipment specified on the labeling for use during all phases of the application. Material Safety Data Sheets (MSDS)shall be available for all pesticide products.

3.7.4 Application

Pesticides shall be applied by a State Certified Pesticide Applicator in accordance with EPA label restrictions and recommendation. The Certified Applicator shall wear clothing and personal protective equipment as specified on the pesticide label. Water used for formulating shall only come from locations designated by the Contracting Officer. The Contractor shall not allow the equipment to overflow. Prior to application of pesticide, all equipment shall be inspected for leaks, clogging, wear, or damage and shall be repaired prior to being used.

3.8 PREVIOUSLY USED EQUIPMENT

The Contractor shall clean all previously used construction equipment prior to bringing it onto the project site. The Contractor shall ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. The Contractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

3.9 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.10 MILITARY MUNITIONS

In the event the Contractor discovers or uncovers military munitions as defined in 40 CFR 260, the Contractor shall immediately stop work in that area and immediately inform the Contracting Officer.

3.11 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Additional meetings shall be conducted for new personnel and when site conditions change. The training and meeting agenda shall include: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.12 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". The Contractor shall, unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be graded, filled and the entire area seeded unless otherwise indicated.

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SECTION 01356A

STORM WATER POLLUTION PREVENTION MEASURES

08/96

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SECTION 01356A

STORM WATER POLLUTION PREVENTION MEASURES
08/96

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4439	(1997) Standard Terminology for Geosynthetics
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1997) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4873	(2001) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 GENERAL

The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01354 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit attached to that Section.

1.3 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-07 Certificates

Mill Certificate or Affidavit; G

Certificate attesting that the Contractor has met all specified requirements.

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described below.

1.4.1 Stabilization Practices

The stabilization practices to be implemented shall include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. On his daily CQC Report, the Contractor shall record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, stabilization practices shall be initiated as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.4.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity [temporarily or] permanently ceases is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

1.4.1.2 No Activity for Less Than 21 Days

Where construction activity will resume on a portion of the site within 21 days from when activities ceased (e.g., the total time period that construction activity is temporarily ceased is less than 21 days), then stabilization practices do not have to be initiated on that portion of the site by the fourteenth day after construction activity temporarily ceased.

1.4.2 Structural Practices

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

1.4.2.1 Silt Fences

The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Contracting Officer.

1.4.2.2 Diversion Dikes

Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches.

The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic. Diversion dikes shall be located as shown on the drawings.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)		30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

The Contractor shall use steel posts for fence construction. Steel posts (standard "U" Or "T" section) utilized or slit fence construction, shall have a minimum weights of 1.33 pounds per linear foot and a minimum length of 5 feet. Steel wire fence shall be standard gauge "American Fence" woven field fence.

2.1.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.1.4 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 8 inches wide and 8 inches deep on the upslope side of the location of the silt fence. The 8-inch by 8-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Contracting Officer.

3.2 MAINTENANCE

The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

3.2.1 Silt Fence Maintenance

Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade.

3.2.2 Diversion Dike Maintenance

Diversion dikes shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an acceptable grade.

3.3 INSPECTIONS

3.3.1 General

The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

3.3.2 Inspections Details

Disturbed areas [and areas used for material storage that are exposed to precipitation] shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.3.3 Inspection Reports

For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

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SECTION 01420

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SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS
12/02

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
Internet: http://www.aci-int.org

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)
4301 North Fairfax Dr., Suite 425
ATTN: Pubs Dept.
Arlington, VA 22203
Ph: 703-524-8800
Fax: 703-528-3816
E-mail: ari@ari.org
Internet: http://www.ari.org

AIR CONDITIONING CONTRACTORS OF AMERICA (ACCA)
2800 Shirlington Road, Suite 300
Arlington, VA 22206
Ph: 703-575-4477
FAX: 703-575-4449
Internet: http://www.acca.org

AIR DIFFUSION COUNCIL (ADC)
1000 East Woodfield Road, Suite 102
Shaumburg, IL 60173-5921
Ph: 847-706-6750
Fax: 847-706-6751
Internet: http://www.flexibleduct.org

AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA)
30 W. University Dr.
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088
Internet: http://www.amca.org

ALUMINUM ASSOCIATION (AA)

900 19th Street N.W.
Washington, DC 20006
Ph: 202-862-5100
Fax: 202-862-5164
Internet: http://www.aluminum.org

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1827 Walden Ofc. Sq.
Suite 104
Schaumburg, IL 60173-4268
Ph: 847-303-5664
Fax: 847-303-5774
Internet: http://www.aamanet.org

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
444 N. Capital St., NW, Suite 249
Washington, DC 20001
Ph: 800-231-3475 202-624-5800
Fax: 800-525-5562 202-624-5806
Internet: http://www.aashto.org

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)
P.O. Box 12215
Research Triangle Park, NC 27709-2215
Ph: 919-549-8141
Fax: 919-549-8933
Internet: http://www.aatcc.org

AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA)
2025 M Street, NW, Suite 800
Washington, DC 20036
Ph: 202-367-1155
Fax: 202-367-2155
Internet: http://www.abma-dc.org

AMERICAN BOILER MANUFACTURERS ASSOCIATION (ABMA)
4001 North 9th Street, Suite 226
Arlington, VA 22203-1900
Ph: 703-522-7350
Fax: 703-522-2665
Internet: http://www.abma.com

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)
222 West Las Colinas Blvd., Suite 641
Irving, TX 75039-5423
Ph: 972-506-7216 or 800-290-2272
Fax: 972-506-7682
Internet: http://www.concrete-pipe.org

e-mail: info@concrete-pipe.org

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
1330 Kemper Meadow Dr.
Suite 600
Cincinnati, OH 45240
Ph: 513-742-2020
Fax: 513-742-3355
Internet: http://www.acgih.org
E-mail: pubs@acgih.org

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)
American Wood Council
ATTN: Publications Dept.
1111 Nineteenth St. NW, Suite 800
Washington, DC 20036
Ph: 800-294-2372 or 202-463-2700
Fax: 202-463-2471
Internet: http://www.afandpa.org/awc/

AMERICAN GAS ASSOCIATION (AGA)
400 N. Capitol St. N.W.Suite 450
Washington, D.C. 20001
Ph: 202-824-7000
Fax: 202-824-7115
Internet: http://www.aga.org

AMERICAN GAS ASSOCIATION LABORATORIES (AGAL)
400 N. Capitol St. N.W.Suite 450
Washington, D.C. 20001
Ph: 202-824-7000
Fax: 202-824-7115
Internet: http://www.aga.org

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)
1500 King St., Suite 201
Alexandria, VA 22314-2730
Ph: 703-684-0211
Fax: 703-684-0242
Internet: http://www.agma.org

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
One East Wacker Dr., Suite 3100
Chicago, IL 60601-2001
Ph: 312-670-2400
Publications: 800-644-2400
Fax: 312-670-5403
Internet: http://www.aisc.org

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)
7012 So. Revere Parkway, Suite 140
Englewood, CO 80112
Ph: 303-792-9559
Fax: 303-792-0669
Internet: http://www.aitc-glulam.org

AMERICAN IRON AND STEEL INSTITUTE (AISI)
1101 17th St., NW Suite 1300
Washington, DC 20036

Ph: 202-452-7100
Internet: http://www.steel.org

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
Internet: http://www.ansi.org/

Note --- Documents beginning with the letter "S" can be ordered from:

Acoustical Society of America
Standards and Publications Fulfillment Center
P. O. Box 1020
Sewickley, PA 15143-9998
Ph: 412-741-1979
Fax: 412-741-0609
Internet: http://asa.aip.org
General e-mail: asa@aip.org
Publications e-mail: asapubs@abdintl.com

AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA)
1250 I St., NW, Suite 500
Washington, DC 20005-3922
Ph: 202-789-2900
FAX: 202-789-1893
Internet: http://www.anla.org

AMERICAN PETROLEUM INSTITUTE (API)
1220 L St., NW
Washington, DC 20005-4070
Ph: 202-682-8000
Fax: 202-682-8223
Internet: http://www.api.org

AMERICAN PUBLIC HEALTH ASSOCIATION (APHA)
800 I Street, NW
Washington, DC 20001
PH: 202-777-2742
FAX: 202-777-2534
Internet: http://www.apha.org

AMERICAN RAILWAY ENGINEERING & MAINTENANCE-OF-WAY ASSOCIATION (AREMA)
8201 Corporate Dr., Suite 1125
Landover, MD 20785-2230
Ph: 301-459-3200
Fax: 301-459-8077
Internet: http://www.arema.org

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
1711 Arlingate Lane
P.O. Box 28518
Columbus, OH 43228-0518
Ph: 800-222-2768
Fax: 614-274-6899
Internet: http://www.asnt.org

AMERICAN SOCIETY FOR QUALITY (ASQ)
600 North Plankinton Avenue
Milwaukee, WI 53202-3005
Ph: 800-248-1946
Fax: 414-272-1734
Internet: http://www.asq.org

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191-4400
Ph: 703-295-6300 - 800-548-2723
Fax: 703-295-6222
Internet: http://www.asce.org
e-mail: marketing@asce.org

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)
1791 Tullie Circle, NE
Atlanta, GA 30329
Ph: 800-527-4723 or 404-636-8400
Fax: 404-321-5478
Internet: http://www.ashrae.org

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
901 Canterbury, Suite A
Westlake, OH 44145
Ph: 440-835-3040
Fax: 440-835-3488
E-mail: asse@ix.netcom.com
Internet: http://www.asse-plumbing.org

AMERICAN WATER WORKS ASSOCIATION(AWWA)
6666 West Quincy
Denver, CO 80235
Ph: 800-926-7337 - 303-794-7711
Fax: 303-794-7310
Internet: http://www.awwa.org

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
Internet: http://www.amweld.org

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)
P.O. Box 5690
Grandbury, TX 76049-0690
Ph: 817-326-6300
Fax: 817-326-6306
Internet: http://www.awpa.com

APA - THE ENGINEERED WOOD ASSOCIATION (APA)
P.O.Box 11700
Tacoma, WA 98411-0700
Ph: 253-565-6600
Fax: 253-565-7265
Internet: http://www.apawood.org

ARCHITECTURAL WOODWORK INSTITUTE (AWI)
1952 Isaac Newton Square West
Reston, VA 20190
Ph: 703-733-0600
Fax: 703-733-0584
Internet: http://www.awinet.org

ASBESTOS CEMENT PIPE PRODUCERS ASSOCIATION (ACPPA)
PMB114-1745 Jefferson Davis Highway
Arlington, VA 22202
Ph: 514-861-1153
Fax: 514-861-1152
Internet: None

ASM INTERNATIONAL (ASM)
9639 Kinsman Road
Materials Park, OH 44073-0002
Ph: 440-338-5151
Fax: 440-338-4634
Internet: http://www.asm-intl.org
Order Publications From:
ASM International
ATTN: MSC/Book Order
P.O. Box 473
Novelty, OH 44072-9901

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

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

ASSOCIATED AIR BALANCE COUNCIL (AABC)
1518 K St., NW, Suite 503
Washington, DC 20005
Ph: 202-737-0202
Fax: 202-638-4833
Internet: http://www.aabchq.com
E-mail: aabchq@aol.com

ASSOCIATION FOR THE ADVANCEMENT OF MEDICAL INSTRUMENTATION (AAMI)
1110 N. Glebe Rd., Suite 220
Arlington, VA 22201-5762
Ph: 1-800l-332-2264 or 703-525-4890
Fax: 703-276-0793
Internet: http://www.aami.org

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)
600 No. 18th St.

P.O. Box 2641
Birmingham, AL 35291
Ph: 205-257-2530
Fax: 205-257-2540
Internet: http://www.aeic.org

ASSOCIATION OF HOME APPLIANCE MANUFACTURERS (AHAM)
1111 19th St. NW., Suite 402
Washington, DC 20036
Ph: 202-872-5955
Fax: 202-872-9354
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SECTION 01451A

CONTRACTOR QUALITY CONTROL

01/03

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SECTION 01451A

CONTRACTOR QUALITY CONTROL
01/03

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 basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 5 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer shall be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified

deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The

Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation shall be promptly furnished to the CQC organization by the Contractor. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, or have a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: civil, materials technician, submittals clerk. These individuals shall be directly employed by the prime Contractor and may not be employed by a supplier or sub-contractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
b.	Submittals	Submittal Clerk with 1 yr experience
c.	Concrete, Pavements and Soils	Materials Technician with 2 yrs experience for the appropriate area

Experience Matrix

Area	Qualifications

3.4.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 15950A HEATING, VENTILATING AND AIR CONDITIONING (HVAC) CONTROL SYSTEMS; 15951A DIRECT DIGITAL CONTROL FOR HVAC; 15990A TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS; or 15995A COMMISSIONING OF HVAC SYSTEMS are included in the contract, the submittals required by those sections shall be coordinated with Section 01330 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the

contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection 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.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final 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 Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. 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 titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 12 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

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. 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 or for excess costs or damages by the Contractor.

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02/97

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SECTION 01500A

TEMPORARY CONSTRUCTION FACILITIES
02/97

1.1 GENERAL REQUIREMENTS

1.1.1 Site Plan

The Contractor shall establish temporary construction facilities away from the project site, at the construction access yard in the vicinity as shown. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.1.2 Identification of Employees

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work to display, identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.1.3 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

1.2 AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1 Payment for Utility Services

The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

1.2.2 Meters and Temporary Connections

The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall notify the Contracting

Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor shall not make the final electrical connection.

1.2.3 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

1.2.4 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, the Contractor shall notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, and remove the meters. The Contractor shall then remove all the temporary distribution lines, meter bases, and associated paraphernalia. The Contractor shall pay all outstanding utility bills before final acceptance of the work by the Government.

1.2.5 Sanitation

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.2.6 Telephone

The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.3 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

1.3.2 Project and Safety Signs

The requirements for the signs, their content, and location shall be as shown on the drawings. The signs shall be erected within 15 days after receipt of the notice to proceed. The data required by the safety sign

shall be corrected daily, with light colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed from the site.

1.4 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.4.1 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.4.2 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. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.5 CONTRACTOR'S TEMPORARY FACILITIES

1.5.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.5.2 Storage Area

The Contractor shall construct a temporary 6 foot high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored [green] [brown], so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the military boundaries. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.

1.5.3 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

1.5.4 Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on the military property.

1.5.5 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.5.6 New Building

In the event a new building is constructed for the temporary project field office, it shall be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. It shall be equipped with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. It shall be provided with a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building shall be

waterproof, shall be supplied with heater, shall have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities shall be furnished. The windows and doors shall be screened and the doors provided with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins shall be non-removable. The windows shall be arranged to open and to be securely fastened from the inside. Glass panels in windows shall be protected by bars or heavy mesh screens to prevent easy access to the building through these panels. In warm weather, air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F, shall be furnished. Any new building erected for a temporary field office shall be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work shall become the property of the Contractor and shall be removed from the site. All charges for telephone service for the temporary field office shall be borne by the Contractor, including long distance charges up to a maximum of $75.00 per month.

1.5.7 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.6 DELETED

1.7 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The devices shall be made available for use by Government personnel.

1.8 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.9 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked

when stored.

1.10 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

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SECTION 01572

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
02/03

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 [contract award][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 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.

1.5 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:

1.5.1 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.

1.5.2 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.

1.5.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.6 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.6.1 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.

1.6.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

1.6.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

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SECTION 01780A

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05/02

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SECTION 01780A

CLOSEOUT SUBMITTALS
05/02

PART 1 GENERAL

1.1 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-02 Shop Drawings

As-Built Drawings; G

Drawings showing final as-built conditions of the project. The final CADD as-built drawings shall consist of one set of electronic CADD drawing files in the specified format, one set of mylar drawings, 2 sets of blue-line prints of the mylars, and one set of the approved working as-built drawings.

SD-03 Product Data

As-Built Record of Equipment and Materials; G

Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.

Final Cleaning; G

Two copies of the listing of completed final clean-up items.

1.2 PROJECT RECORD DOCUMENTS

1.2.1 As-Built Drawings

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract drawings which are revised to be used for final as-built drawings.

1.2.1.1 Government Furnished Materials

One set of [mylar drawings revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring manually prepared as-built drawings] [electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file as-built drawings].

1.2.1.2 Working As-Built and Final As-Built Drawings

The Contractor shall revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and at least one set shall be available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Final as-built drawings shall be prepared after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final as-built drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final as-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. The working and final as-built drawings shall show, but shall not be limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

b. The location and dimensions of any changes within the building structure.

c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or modifications which result from the final inspection.

g. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.

h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

j. Modifications (change order price shall include the Contractor's cost to change working and final as-built drawings to reflect modifications) and compliance with the following procedures.

(1) Directions in the modification for posting descriptive changes shall be followed.

(2) A Modification Circle shall be placed at the location of each deletion.

(3) For new details or sections which are added to a drawing, a Modification Circle shall be placed by the detail or section title.

(4) For minor changes, a Modification Circle shall be placed by the area changed on the drawing (each location).

(5) For major changes to a drawing, a Modification Circle shall be placed by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, a Modification Circle shall be placed either by the schedule heading or by the change in the schedule.

(7) The Modification Circle size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.2.1.3 Drawing Preparation

The as-built drawings shall be modified as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned to the Contracting Officer after approval by the Government. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

1.2.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only personnel proficient in the preparation of CADD drawings shall be employed to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings shall be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols shall be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final as-built drawings shall be identical to that used on the contract drawings. Additions and corrections to the contract drawings shall be accomplished using CADD files. The Contractor will be furnished "as-designed" drawings in Microstation J format compatible with a Windows NT operating system. The electronic files will

be supplied on compact disc, read-only memory (CD-ROM). The Contractor shall be responsible for providing all program files and hardware necessary to prepare final as-built drawings. The Contracting Officer will review final as-built drawings for accuracy and the Contractor shall make required corrections, changes, additions, and deletions.

a. CADD colors shall be the "base" colors of red, green, and blue. Color code for changes shall be as follows:

(1) Deletions (red) - Deleted graphic items (lines) shall be colored red with red lettering in notes and leaders.

(2) Additions (Green) - Added items shall be drawn in green with green lettering in notes and leaders.

(3) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes shall be in blue.

b. The Contract Drawing files shall be renamed in a manner related to the contract number (i.e., 98-C-10.DGN) as instructed in the Pre-Construction conference. Marked-up changes shall be made only to those renamed files. All changes shall be made on the layer/level as the original item. There shall be no deletions of existing lines; existing lines shall be over struck in red. Additions shall be in green with line weights the same as the drawing. Special notes shall be in blue on layer #63.

c. When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high. All other contract drawings shall be marked either "AS-Built" drawing denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions. Original contract drawings shall be dated in the revision block.

d. Within 10 days for contracts less than $5 million after Government approval of all of the working as-built drawings for a phase of work, the Contractor shall prepare the final CADD as-built drawings for that phase of work and submit two sets of blue-lined prints of these drawings for Government review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 7 days for contracts less than $5 million the Contractor shall revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 10 days for contracts less than $5 million of substantial completion of all phases of work, the Contractor shall submit the final as-built drawing package for the entire project. The submittal shall consist of one set of electronic files on compact disc, read-only memory (CD-ROM), one set of mylars, two sets of blue-line prints and one set of the approved working as-built drawings. They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final as-built drawing files and marked prints as specified shall be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final as-built drawings shall be accomplished

before final payment is made to the Contractor.

1.2.1.5 Payment

No separate payment will be made for as-built drawings required under this contract, and all costs accrued in connection with such drawings shall be considered a subsidiary obligation of the Contractor.

1.2.2 Final Approved Shop Drawings

The Contractor shall furnish final approved project shop drawings 30 days after transfer of the completed facility.

1.2.3 Construction Contract Specifications

The Contractor shall furnish final as-built construction contract specifications, including modifications thereto, 30 days after transfer of the completed facility.

1.2.4 Real Property Equipment

The Contractor shall furnish a list of installed equipment furnished under this contract. The list shall include all information usually listed on manufacturer's name plate. The "EQUIPMENT-IN-PLACE LIST" shall include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. A draft list shall be furnished at time of transfer. The final list shall be furnished 30 days after transfer of the completed facility.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 02231

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07/02

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SECTION 02231

CLEARING AND GRUBBING
07/02

PART 1 GENERAL

1.1 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

Materials Other Than Salable Timber; G

Written permission to dispose of such products on private property shall be filed with the Contracting Officer.

SD-04 Samples

Tree wound paint

Herbicide

Submit samples in cans with manufacturer's label.

1.2 DELIVERY, STORAGE, AND HANDLING

Deliver materials to, store at the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

2.1 TREE WOUND PAINT

Bituminous based paint of standard manufacture specially formulated for tree wounds.

2.2 HERBICIDE

Comply with Federal Insecticide, Fungicide, and Rodenticide Act (Title 7 U.S.C. Section 136) for requirements on contractor's licensing, certification and record keeping. Contact the command Pest Control Coordinator prior to starting work.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Trees, Shrubs, and Existing Facilities

Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting Officer in ample time to minimize interruption of the service. Refer to Section 01310N, ADMINISTRATIVE REQUIREMENTS and Section 01575N, TEMPORARY ENVIRONMENTAL CONTROLS for additional utility protection.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint. Apply herbicide in accordance with the manufacturer's label to the top surface of stumps designated not to be removed.

3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 PRUNING

Trim trees designated to be left standing within the cleared areas of dead branches 1 1/2 inches or more in diameter; and trim branches to heights and in a manner as indicated. Neatly cut limbs and branches to be trimmed close to the bole of the tree or main branches. Paint cuts more than 1 1/4 inches in diameter with an approved tree wound paint.

3.5 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas.
Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.6 DISPOSAL OF MATERIALS

3.6.1 Saleable Timber

Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuelwood can be produced as saleable timber. Trim limbs and tops, and saw into saleable lengths for saw logs, for pulpwood, for poles for, ties for fuelwood, and stockpile adjacent to the site. The stockpile timber will remain the property of the Government.]

3.6.2 Nonsaleable Materials

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, except for salable timber, shall be disposed of outside the limits of Government-controlled land at the Contractor's responsibility. Such directive will state the conditions covering the disposal of such products and will also state the areas in which they may be placed. [Refuse to be burned shall be burned at specified locations and in a manner to prevent damage to existing structures and appurtenances, construction in progress, trees, and other vegetation. The Contractor shall be responsible for compliance with all Federal and State laws and regulations and with reasonable practice relative to the building of fires. Burning or other disposal of refuse and debris and any accidental loss or damage attendant thereto shall be the Contractor's responsibility.]

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SECTION 02300A

EARTHWORK

12/97

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SECTION 02300A

EARTHWORK
12/97

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	(1997) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457 mm (18-in) Drop
AASHTO T 224	(1996) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1140	(1997) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and

Plasticity Index of Soils

1.2 MEASUREMENT

1.2.1 Excavation

The unit of measurement for excavation and borrow will be the cubic yard, computed by the average end area method from cross sections taken before and after the excavation and borrow operations. The volume to be paid for will be the number of cubic yards of material measured in its original position and removed from the excavation and borrow areas, including the excavation for ditches, gutters, and channel changes, when the material is acceptably utilized or disposed of as herein specified. The measurements will include authorized excavation of rock, authorized excavation of unsatisfactory subgrade soil, and the volume of loose, scattered rocks and boulders collected within the limits of the work; allowance will be made on the same basis for selected backfill ordered as replacement. The measurement will not include the volume of subgrade material or other material that is scarified or plowed and reused in-place, and will not include the volume excavated without authorization or the volume of any material used for purposes other than directed. The volume of overburden stripped from borrow pits and the volume of excavation for ditches to drain borrow pits, unless used as borrow material, will not be measured for payment. The measurement will not include the volume of any excavation performed prior to the taking of elevations and measurements of the undisturbed grade.

1.2.2 Topsoil Requirements

Separate excavation, hauling, and spreading or piling of topsoil and related miscellaneous operations will be considered subsidiary obligations of the Contractor, covered under the contract unit price for excavation.

1.2.3 Overhaul Requirements

The unit of measurement for overhaul will be the station-yard. The number of station-yards of overhaul to be paid for will be the product of number of cubic yards of overhaul material measured in the original position, multiplied by the overhaul distance measured in stations of 100 feet. The overhaul distance will be the distance in stations between the center of volume of the overhaul material in its original position and the center of volume after placing, minus the free-haul distance in stations. The haul distance will be measured along the shortest route determined by the Contracting Officer as feasible and satisfactory. Unsatisfactory materials or waste will not be measured for overhaul where the length of haul for borrow is within the free-haul limits.

1.3 PAYMENT

Payment will constitute full compensation for all labor, equipment, tools, supplies, and incidentals necessary to complete the work.

1.3.1 Classified Excavation

Classified excavation will be paid for at the contract unit prices per cubic yard for common or rock excavation.

1.3.2 Unclassified Excavation

Unclassified excavation will be paid for at the contract unit price per cubic yard for unclassified excavation.

1.3.3 Classified Borrow

Classified borrow will be paid for at the contract unit prices per cubic yard for common or rock borrow.

1.3.4 Unclassified Borrow

Unclassified borrow will be paid for at the contract unit price per cubic yard for unclassified borrow.

1.3.5 Authorized Overhaul

Authorized overhaul will be paid for at the contract unit price per station-yard for overhaul in excess of the free-haul limit as designated in paragraph DEFINITIONS.

1.4 DEFINITIONS

1.4.1 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. Satisfactory materials for grading shall be comprised of stones less than 8 inches, except for fill material for pavements and railroads which shall be comprised of stones less than 3 inches in any dimension.

1.4.2 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.

1.4.3 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.

1.4.4 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 1557abbreviated 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.

1.4.5 Topsoil

Material suitable for topsoils obtained from excavations is defined as topsoil.

1.5 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

Earthwork; G.

Procedure and location for disposal of unused satisfactory material. Blasting plan when blasting is permitted. Proposed source of borrow material.

Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

SD-06 Test Reports

Testing; G.

Within 24 hours of conclusion of physical tests, [_____] copies of test results, including calibration curves and results of calibration tests.

SD-07 Certificates

Testing; G.

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

1.6 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.6.1 Rock Excavation

Rock excavation shall include blasting, excavating, grading, and disposing of material classified as rock and shall include the satisfactory removal and disposal of boulders 1/2 cubic yard or more in volume; solid rock; rock material that is in ledges, bedded deposits, and unstratified masses, which cannot be removed without systematic drilling and blasting; and firmly cemented conglomerate deposits possessing the characteristics of solid rock impossible to remove without systematic drilling and blasting. The removal of any concrete or masonry structures, except pavements, exceeding 1/2 cubic yard in volume that may be encountered in the work

shall be included in this classification. If at any time during excavation, including excavation from borrow areas, the Contractor encounters material that may be classified as rock excavation, such material shall be uncovered and the Contracting Officer notified by the Contractor. The Contractor shall not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation and has taken cross sections as required. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for the areas of work in which such deposits occur.

1.6.2 Common Excavation

Common excavation shall include the satisfactory removal and disposal of all materials not classified as rock excavation.

1.7 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of in designated waste disposal or spoil areas. 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 in designated areas approved for surplus material storage or designated waste areas as directed. Newly designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. Coarse rock from excavations shall be stockpiled and used for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, topsoil shall be stripped to a depth of 4 to 6 inches. Topsoil shall be spread on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Any surplus of topsoil from excavations and grading shall be [stockpiled in locations indicated] [removed from the site].

3.2 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 the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Excavation of ditches, gutters, and channel changes shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Ditches and gutters shall not be excavated below grades shown. Excessive open ditch or gutter excavation shall be backfilled with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Material excavated shall be disposed of as shown or as directed, except that in no case shall material be deposited less than 4 feet from the edge of a ditch. The Contractor shall maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 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. Where pile foundations are to be used, the excavation of each pit shall be stopped at an elevation 1 foot above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, loose and displaced material shall be removed and excavation completed, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.3 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas within the limits of the project site, selected by the Contractor or from approved private sources. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on

Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

3.4 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, borrow pits and other 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. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.5 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.

3.6 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure. 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, and Section 02630 STORM-DRAINAGE SYSTEM; and Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.7 PREPARATION OF GROUND SURFACE FOR EMBANKMENTS

3.7.1 General Requirements

Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material; plowed, disked, or otherwise broken up to a depth of 6 inches; pulverized; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment materials to assure adequate bond between embankment material and the

prepared ground surface.

3.8 EMBANKMENTS

3.8.1 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 6 inchesin 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 for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. 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.

3.9 SUBGRADE PREPARATION

3.9.1 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. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 1/2 inch when tested with a 10 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.

3.9.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas and railroads, each layer of the embankment shall be compacted to at least 100 percent of laboratory maximum density.

3.9.2.1 Subgrade for Pavements and Walks

Subgrade for pavements shall be compacted to at least 100 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, the top 6 inches of subgrade shall be scarified, windrowed, thoroughly blended, reshaped, and compacted.

3.10 SHOULDER CONSTRUCTION

Shoulders shall be constructed of satisfactory excavated or borrow material or as otherwise shown or specified. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission of the Contracting Officer has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above, for specific ranges of depth below the surface of the shoulder. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section shown.

3.11 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. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

3.12 PLACING TOPSOIL

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly to a thickness of 4 inches and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from [offsite areas] [areas indicated].

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. 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 2922results 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 50 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM D 422.

3.13.2 In-Place Densities

a. One test per 400 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 400 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

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 1000 square feet, or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines.

b. One check test per lift for each 1000 square feet, of fill or backfill areas compacted by hand-operated machines.

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 including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 500 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 SUBGRADE AND EMBANKMENT PROTECTION

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.

-- End of Section --

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SECTION 02370A

SOIL SURFACE EROSION CONTROL

01/03

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SECTION 02370A

SOIL SURFACE EROSION CONTROL

01/03

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 basic designation only.

ASTM INTERNATIONAL (ASTM) (ASTM)

ASTM D 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft.(600kN-m/cu. m.))
ASTM D 977	(1998) Emulsified Asphalt
ASTM D 1560	(1992; R 2000) Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
ASTM D 1777	(1996) Thickness of Textile Materials
ASTM D 2028	(1997) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2844	(1994) Resistance R-Value and Expansion Pressure of Compacted Soils
ASTM D 3776	(1996) Mass Per Unit Area (Weight) of Fabric
ASTM D 3787	(2001) Bursting Strength of Textiles - Constant-Rate-of-Traverse (CRT), Ball Burst Test
ASTM D 3884	(2001e1) Abrasion Resistance of Textile Fabrics (Rotary Platform, Double Head Method)
ASTM D 4355	(1999) Deterioration of Geotextiles From Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity

ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1997) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2000) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4972	(2001) pH of Soils
ASTM D 5268	(1992; R 1997) Topsoil Used for Landscaping Purposes

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-02 Shop Drawings

Layout;G
Obstructions Below Ground; G
Erosion Control; G

Scale drawings defining areas to receive recommended materials as required by federal, state or local regulations.

Seed Establishment Period; G

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record; G

Record of maintenance work performed, of measurements and findings for product failure, recommendations for repair, and products replaced.

SD-03 Product Data

Geosynthetic Binders; G
Hydraulic Mulch; G
Geotextile Fabrics; G[_____]
Synthetic Grid Systems; G[_____]

Equipment

A listing of equipment to be used for the application of erosion control materials.

Finished Grade; G

Condition of finish grade status prior to installation; location of underground utilities and facilities.

SD-04 Samples

Materials; G

a. Standard mulch; 2 pounds.

b. Hydraulic mulch; 2 pounds.

c. Geotextile fabrics; 6 inch square.

d. Erosion control blankets; 6 inch square.

e. Synthetic grid systems; One sample grid.

f. Five color charts displaying the colors and finishes for the paving bricks.

SD-07 Certificates

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following.

For items listed in this section:

a. Certification of recycled content or,

b. Statement of recycled content.

c. Certification of origin including the name, address and telephone number of manufacturer.

Erosion Control Plan; G
Construction Work Sequence Schedule; G

Erosion control plan. Construction sequence schedule.

Installer's Qualification; G

Individual component and assembled unit structural integrity test; creep tolerance; deflection tolerance; and vertical load test results. The estimated percentage of recovered material content in the material and components. Life-cycle durability.

Seed; G

Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

1.3 DESCRIPTION OF WORK

The work shall consist of furnishing and installing soil surface erosion control materials, including fine grading, blanketing, stapling, mulching and miscellaneous related work, within project limits and in areas outside the project limits where the soil surface is disturbed from work under this contract at the designated locations. This work shall include all necessary materials, labor, supervision and equipment for installation of a complete system. This section shall be coordinated with the requirements of Section 02300A EARTHWORK and Section 02921A SEEDING.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

Materials shall be stored in designated areas and as recommended by the manufacturer protected from the elements, direct exposure, and damage. Containers shall not be dropped from trucks. Material shall be free of defects that would void required performance or warranty. Geosynthetic binders and synthetic soil binders shall be delivered in the manufacturer's original sealed containers and stored in a secure area.

a. Erosion control blankets and geotextile fabric shall be furnished in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure prior to placement. Erosion control blanket and geotextile fabric rolls shall be labeled to provide identification sufficient for inventory and quality control purposes.

b. All synthetic grids, synthetic sheets, and articulating cellular concrete block grids shall be sound and free of defects that would interfere with the proper placing of the block or impair the strength or permanence of the construction. Minor cracks in synthetic grids and concrete cellular block, incidental to the usual methods of manufacture, or resulting from standard methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

c. Seed shall be inspected upon arrival at the jobsite for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected.

1.5 SUBSTITUTIONS

Substitutions will not be allowed without written request and approval from the Contracting Officer.

1.6 INSTALLER'S QUALIFICATION

The installer shall be certified by the manufacturer for training and experience installing the material.

1.7 TIME LIMITATIONS

Backfilling the openings in synthetic grid systems and articulating cellular concrete block systems shall be completed a maximum 7 days after placement to protect the material from ultraviolet radiation.

1.8 WARRANTY

Erosion control material shall have a warranty for use and durable

condition for project specific installations. Temporary erosion control materials shall carry a minimum eighteen month warranty. Permanent erosion control materials shall carry a minimum three year warranty.

PART 2 PRODUCTS

2.1 BINDERS

2.1.1 Geosynthetic Binders

Geosynthetic binders shall be manufactured in accordance with ASTM D 1560, ASTM D 2844; and shall be referred to as products manufactured for use as modified emulsions for the purpose of erosion control and soil stabilization. Emulsions shall be manufactured from all natural materials and provide a hard durable finish.

2.2 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.2.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.2.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.2.3 Wood Cellulose Fiber

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: a minimum 9 to a maximum 15 percent moisture, and between a minimum 4.5 to a maximum 6.0 pH.

2.2.4 Paper Fiber

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.

2.2.5 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.2.6 Wood By-Products

Wood locally chipped or ground bark shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2 inch wide by 4 inch long.

2.2.7 Coir

Coir shall be manufactured from 100 percent coconut fiber cured in fresh water for a minimum of 6 months.

2.2.8 Asphalt Adhesive

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1; and cutback asphalt, conforming to ASTM D 2028, Designation RC-70.

2.2.9 Mulch Control Netting

Mulch control netting may be constructed of lightweight recycled plastic, cotton, or paper or organic fiber. The recycled plastic shall be a woven or nonwoven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from UV, and with the following properties:

a. Minimum grab tensile strength (TF 25 #1/ASTM D 4632), 180 pounds.

b. Minimum Puncture (TF 25 #4/ASTM D 3787), 75 psi in the weakest direction.

c. Apparent opening sieve size of a minimum 40 and maximum 80 (U.S. Sieve Size)..

d. Minimum Trapezoidal tear strength (TF 25 #2/ASTM D 4533), 50 pounds.

2.2.10 Hydraulic Mulch

Hydraulic mulch shall be made of 100 percent virgin aspen wood fibers. Wood shall be naturally air-dried to a moisture content of 10.0 percent, plus or minus 3.0 percent. A minimum of 50 percent of the fibers shall be equal to or greater than 0.15 inch in length and a minimum of 75 percent of the fibers shall be retained on a 28 mesh screen. No reprocessed paper fibers shall be included in the hydraulic mulch.Hydraulic mulch shall have the following mixture characteristics:

CHARACTERISTIC (typical)	VALUE
pH	5.4 ± 0.1
Organic Matter (oven dried basis),	percent 99.3 within ± 0.2
Inorganic Ash (oven dried basis),	percent 0.7 within ± 0.2
Water Holding Capacity,	percent 1,401

2.3 GEOTEXTILE FABRICS

Geotextile fabrics shall be woven of polypropylene filaments formed into a stable network so that the filaments retain their relative position to each other. Sewn seams shall have strength equal to or greater than the geotextile itself. Fabric shall be installed to withstand maximum velocity flows as recommended by the manufacturer. The geotextile shall conform to the following minimum average roll values:

Property	Performance	Test Method
Weight		ASTM D 3776
Thickness		ASTM D 1777
Permeability		ASTM D 4491
Abrasion Resistance,	58 percent X	
Type (percent strength retained)	81 percent	ASTM D 3884

Property	Performance	Test Method
Tensile Grab Strength	1,467 N X 1, 933 N	ASTM D 4632
Grab Elongation	15percent X 20percent	ASTM D 4632
Burst Strength	5,510 kN/m^2	ASTM D 3787
Puncture Strength	733 N	ASTM D 4833
Trapezoid Tear	533 N X 533 N	ASTM D 4533
Apparent Opening Size	40 US Std Sieve	ASTM D 4751
UV Resistance @ 500 hrs	90 percent	ASTM D 4355

2.4 EROSION CONTROL BLANKETS

2.4.1 Erosion Control Blankets Type I

Material Content

Straw 100 percent with approximately 0.50 lb/yd^2 weight

Netting One side only, lightweight photodegradable with approximately 1.64 lb/1,000 ft^2 weight.

Thread Degradable

Note 1: Photodegradable life a minimum of 2 months with a minimum 90 percent light penetration. Apply to slopes up to a maximum 3:1 gradient.

2.4.2 Erosion Control Blankets Type II

1. Machine fabricated ECB covered on both sides by netting and sewn together on two inch centers with minimum 750 denier photodegradable, polypropylene thread.
2. Straw fiber shall be 100 percent weed free, homogeneously blended and distributed evenly throughout the ECB.
3. Netting shall be photodegradable polypropylene with mesh openings of approximately 0.5 in by 0.5 in.
4. Typical Values:

Property	Test Method	Units	Property Requirement
Thickness	ASTM D-1777	mm(in)	6.4(0.25)
Tensile Strength	ASTM D-4595	kN/m(lbs/ft)	1.7 x 0.9(112 x 64)
Tensile Elongation	ASTM D-4595	percent	42 x 28

2.3.3 Erosion Control Blankets Type III

1. Machine fabricated ECB covered on both sides by netting and sewn together on two inch centers with minimum 1000 denier, Ultraviolet (UV) stabilized polypropylene thread on the top and bottom.
2. Fiber shall be 100 percent mattress grade, coconut fiber, homogeneously blended and distributed evenly throughout the ECB.
3. Netting shall be UV stabilized polypropylene with mesh openings of approximately 0.625 in by 0.625 in.
4. Index Property Typical Values:

Property	Test Method	Units	Property Requirement
Thickness	ASTM D-1777	mm(in)	6.4(0.25)
Tensile Strength	ASTM D-4595	kN/m(lbs/ft)	3.4 x 2.1(230 x 138)
Tensile Elongation	ASTM D-4595	percent	32 x 22

5. Performance Properties: In a vegetated state, the RECP must demonstrate acceptable performance (as defined by the Engineer) when subjected to at least 0.5 hrs of continuos flow producing the following conditions.
a) Permissible velocity: 1.8 m/sec (6 ft/sec)
b) Permissible tractive force (shear stress): 0.77 kPa (1.6 psf.)

2.3.4 Erosion Control Blankets Type IX (Turf Reinforcement Mat)

1. Dense web of green polyolefin fibers positioned between two biaxially-oriented nets, mechanically bound by parallel stitching with polyolefin thread.
2. Matrix to possess strength and elongation properties to limit stretching and be maintained in water saturated condition.
3. All components of matrix stabilized against ultraviolet degradation and inert to chemicals normally encountered in natural soil environment.
4. Minimum Average Roll Values:

Property	Test Method	Units	Property Requirement
Thickness	ASTM D 5199	mm(in)	12.7(0.50)
Resiliency	ASTM D-5199	percent	80
Mass Per Unit Area	ASTM D 5261	G/sq m(oz/sy)	340(10.0)
Tensile Strength	ASTM D-5035	kN/m(lb/ft)	2.4 x 1.8(170 x 130)
Tensile Elongation	ASTM D-5035	percent	50 (max)
Tensile Strength @ 10% Elongation (typical value)	ASTM D-5035	kN/m(lb/ft)	1.6 x 1.1 (110 x 80)
Ground Cover Factor	Light Projection	percent	74
UV Resistance	ASTM D-4355	percent	80 at 1000 hrs

5. Performance Properties: In a vegetated state, the RECP must demonstrate acceptable performance (as defined by the Engineer) when subjected to at least 0.5 hrs of continuos flow producing the following conditions.
a) Permissible velocity: 5.5 m/sec (18 ft/sec)
b) Permissible tractive force (shear stress): 3.36 kPa (7 psf).

2.4.3 Staking

Stakes shall be 100 percent biodegradable manufactured from recycled plastic or wood and shall be designed to safely and effectively secure erosion control blankets for temporary or permanent applications. The biodegradable stake shall be fully degradable by biological activity within a reasonable time frame. The bio-plastic resin used in production of the biodegradable stake shall consist of polylactide, a natural, completely biodegradable substance derived from renewable agricultural resources. The biodegradable stake must exhibit ample rigidity to enable being driven into hard ground, with sufficient flexibility to resist shattering. The biodegradable stake shall have serrations on the leg to increase resistance to pull-out from the soil.

2.3.6 Staples

Staples shall be as recommended by the manufacturer.

2.5 CRUSHED ROCK

Crushed rock shall be crushed run between a minimum 4 inches and a maximum 8 inches.

2.6 WATER

Unless otherwise directed, water shall be the responsibility of the Contractor. Water shall be potable or supplied by an existing irrigation system.

PART 3 EXECUTION

3.1 CONDITIONS

The Contractor shall submit a construction work sequence schedule, with the [state or local government approved] [approved] erosion control plan a minimum of 30 days prior to start of construction. The work schedule shall coordinate the timing of land disturbing activities with the provision of erosion control measures. Erosion control operations shall be performed under favorable weather conditions; when excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped as directed. When special conditions warrant a variance to earthwork operations, a revised construction schedule shall be submitted for approval. Erosion control materials shall not be applied in adverse weather conditions which could affect their performance.

3.1.1 Finished Grade

The Contractor shall verify that finished grades are as indicated on the drawings; finish grading and compaction shall be completed in accordance with Section 02300A EARTHWORK, prior to the commencement of the work. The location of underground utilities and facilities in the area of the work shall be verified and marked. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.1.2 Placement of Erosion Control Blankets

Before placing the erosion control blankets, ensure the subgrade has been graded smooth; has no depressed, void areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter. Vehicles shall not be permitted directly on the blankets.

3.1.3 Synthetic Grid

Before placing the grid system, ensure that the subgrade has been properly grubbed of large roots and rocks; compacted; has been graded smooth; has no depressed, void, soft or uncompacted areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter; and has been seeded.

3.1.4 Concrete Cellular Block

Before placing geotextile fabric under cellular block, ensure that the subgrade has been properly compacted; has been graded smooth; has no depressed, void, soft or uncompacted areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter; and has been seeded. Subgrade compaction shall be at least 90 percent of the maximum dry density at optimum moisture content, as determined by ASTM D 698, and shall be installed to within plus or minus 1 inch of the design elevation.

3.2 SITE PREPARATION

3.2.1 Soil Test

Soil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size and mechanical analysis. Sample collection onsite shall be random over the entire site. The test shall determine the soil particle size as compatible for the specified material.

3.2.2 Layout

Erosion control material locations may be adjusted to meet field conditions. When soil tests result in unacceptable particle sizes, a shop drawing shall be submitted indicating the corrective measures.

3.2.3 Protecting Existing Vegetation

When there are established lawns in the work area, the turf shall be covered and/or protected or replaced after construction operations. Existing trees, shrubs, and plant beds that are to be preserved shall be barricaded along the dripline. Damage to existing trees shall be mitigated by the Contractor at no additional cost to the Government. Damage shall be assessed by a state certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

3.2.4 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to placement of erosion control material shall be submitted for approval.

3.3 INSTALLATION

3.3.1 Seeding

When seeding is required prior to installing mulch on synthetic grid systems the Contractor shall verify that seeding will be completed in accordance with Sections 02300A EARTHWORK and 02921A SEEDING.

3.3.2 Mulch Installation

Mulch shall be installed in the areas indicated. Mulch shall be applied evenly at the rate of 4 inches.

3.3.3 Mulch Control Netting

Netting may be stapled over mulch according to manufacturer's recommendations.

3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydraulic mulch operation.

3.3.5 Hydraulic Mulch Application

3.3.5.1 Unseeded Area

Hydraulic mulch shall be installed as indicated and in accordance with

manufacturer's recommendations. Hydraulic mulch shall be mixed with water at the rate recommended by the manufacturer for the area to be covered. Mixing shall be done in equipment manufactured specifically for hydraulic mulching work, including an agitator in the mixing tank to keep the mulch evenly disbursed.

3.3.5.2 Seeded Area

For drill or broadcast seeded areas, hydraulic mulch shall be applied evenly at the rate of 4 inches per square yard. For hydraulic seeded areas, mulch shall be applied at the rate of 4 inches per square yard with the seed and fertilizer, and at the rate of 2 inches per square yard in a second application of mulch only.

3.3.6 Erosion Control Blankets

a. Erosion control blankets shall be installed as indicated and in accordance with manufacturer's recommendations. The extent of erosion control blankets shall be as shown on drawings.

b. Erosion control blankets shall be oriented in vertical strips and anchored with staples, as indicated. Adjacent strips shall be abutted to allow for installation of a common row of staples. Horizontal joints between erosion control blankets shall be overlapped sufficiently to accommodate a common row of staples with the uphill end on top.

c. Where exposed to overland sheet flow, a trench shall be located at the uphill termination. The erosion control blanket shall be stapled to the bottom of the trench. Backfill and compact the trench as required.

d. Where terminating in a channel containing an installed blanket, the erosion control blanket shall overlap installed blanket sufficiently to accommodate a common row of staples.

3.3.7 Articulating Cellular Concrete Block System Installation

3.3.7.1 Seeding, Fertilizing, Mulching

Seed shall be installed in accordance with Section 02921A SEEDING.

3.4 CLEAN-UP

Excess material, debris, and waste materials shall be disposed offsite at an approved landfill or recycling center. Adjacent paved areas shall be cleared. Immediately upon completion of the installation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.5 WATERING SEED

Watering shall be started immediately after installing erosion control blanket type XI (revegetation mat). Water shall be applied to supplement rainfall at a sufficient rate to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.6 MAINTENANCE RECORD

A record shall be furnished describing the maintenance work performed, record of measurements and findings for product failure, recommendations for repair, and products replaced.

3.6.1 Maintenance

Maintenance shall include eradicating weeds; protecting embankments and ditches from surface erosion; maintaining the performance of the erosion control materials and mulch; protecting installed areas from traffic.

3.6.1.1 Maintenance Instructions

Written instructions containing drawings and other necessary information shall be furnished, describing the care of the installed material; including, when and where maintenance should occur, and the procedures for material replacement.

3.6.1.2 Patching and Replacement

Unless otherwise directed, material shall be placed, seamed or patched as recommended by the manufacturer. Material not meeting the required performance as a result of placement, seaming or patching shall be removed from the site. The Contractor shall replace the unacceptable material at no additional cost to the Government.

3.7 SATISFACTORY STAND OF GRASS PLANTS

When erosion control blanket type XI (revegetation mat) is installed, the grass plants shall be evaluated for species and health when the grass plants are a minimum 1 inch high. A satisfactory stand of grass plants from the revegetation mat area shall be a minimum 10 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total revegetation mat area.

-- End of Section --

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SECTION 02373

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SECTION 02373

GEOTEXTILE
09/01

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4354	(1999) Sampling of Geosynthetics for Testing
ASTM D 4355	(1999) Deterioration of Geotextiles From Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1997) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4759	(1988; R 1996) Determining the Specification Conformance of Geosynthetics
ASTM D 4833	(2000) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2001) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 MEASUREMENT

Measurement shall be made of the as-built surface area in square yards covered by geotextile. Allowance will be made for geotextile in anchor and/or drainage trenches but no allowance will be made for waste, overlaps, damaged materials, repairs, or materials used for the convenience of the Contractor.

1.3 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

Thread; G

A minimum of 7 days prior to scheduled use, proposed thread type for sewn seams along with data sheets showing the physical properties of the thread.

Manufacturing Quality Control Manual Sampling and Testing; G

A minimum of 7 days prior to scheduled use, manufacturer's quality control manual.

SD-04 Samples

Quality Assurance Samples and Tests; G

Samples for quality assurance testing; 7 days shall be allotted in the schedule to allow for testing.

SD-07 Certificates

Geotextile; G

A minimum of 7 days prior to scheduled use, manufacturer's certificate of compliance stating that the geotextile meets the requirements of this section. For needle punched geotextiles, the manufacturer shall also certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

Delivery, storage, and handling of geotextile shall be in accordance with ASTM D 4873.

1.4.1 Delivery

The Contracting Officer shall be notified a minimum of 24 hours prior to delivery and unloading of geotextile rolls. Rolls shall be packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, rolls shall be immediately rewrapped with the plastic wrapping. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Each roll shall be labeled with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

1.4.2 Storage

Rolls of geotextile shall be protected from construction equipment,

chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, rolls shall either be elevated off the ground or placed on a sacrificial sheet of plastic in an area where water will not accumulate.

1.4.3 Handling

Geotextile rolls shall be handled and unloaded with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 RAW MATERIALS

2.1.1 Geotextile

Geotextile shall be a [woven] [nonwoven] pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material [may also] [shall not] be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction. Values for AOS represent maximum average roll values.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES (MARV)	TEST METHOD
GRAB STRENGTH	LBS	205	ASTM D 4632
PUNCTURE	LBS	110	ASTM D 4833
TRAPEZOID TEAR	LBS	85	ASTM D 4533
APPARENT OPENING SIZE	U.S. SIEVE	80	ASTM D 4751
PERMITTIVITY	SEC -1	1.50	ASTM D 4491
ULTRAVIOLET DEGRADATION	PERCENT	70%	ASTM D 4355
Grab Elongation		50%	ASTM D 4632
Mullen Burst		350 psi	ASTM D 3786

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

Wide Width Tensile	75 lb-in	ASTM D 4595
Permeability	0.38 cm/sec	ASTM D 4491
Water Flow Rate	110 gpm/ft2	ASTM D 4491

2.1.2 Thread

Sewn seams shall be constructed with high-strength polyester, nylon, or other approved thread type. Thread shall have ultraviolet light stability equivalent to the geotextile and the color shall contrast with the geotextile.

2.2 MANUFACTURING QUALITY CONTROL SAMPLING AND TESTING

The Manufacturer shall be responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request. Manufacturing quality control sampling and testing shall be performed in accordance with the manufacturer's approved quality control manual. As a minimum, geotextiles shall be randomly sampled for testing in accordance with ASTM D 4354, Procedure A. Acceptance of geotextile shall be in accordance with ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

PART 3 EXECUTION

3.1 QUALITY ASSURANCE SAMPLES AND TESTS

3.1.1 Quality Assurance Samples

The Contractor shall provide assistance to the Contracting Officer in the collection of quality assurance samples. Samples shall be collected upon delivery to the site for quality assurance testing at the request of the Contracting Officer. Samples shall be identified with a waterproof marker by manufacturer's name, product identification, lot number, roll number, and machine direction. The date and a unique sample number shall also be noted on the sample. The outer layer of the geotextile roll shall be discarded prior to sampling a roll. Samples shall then be collected by cutting the full-width of the geotextile sheet a minimum of 3 feet long in the machine direction. Rolls which are sampled shall be immediately resealed in their protective covering.

3.1.2 Quality Assurance Tests

The [Contractor shall] [Contracting Officer will] provide quality assurance samples to an Independent Laboratory. Samples will be tested to verify that geotextile meets the requirements specified in Table 1. Test method ASTM D 4355 shall not be performed on the collected samples. Geotextile product acceptance shall be based on ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

3.2 INSTALLATION

3.2.1 Subgrade Preparation

The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Subgrade materials and compaction requirements shall be in accordance with Specifications.

3.2.2 Placement

The Contractor shall notify the Contracting Officer a minimum of 24 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, the geotextile shall be laid with the machine direction of the fabric parallel to the slope direction.

3.3 SEAMS

3.3.1 Overlap Seams

Geotextile panels shall be continuously overlapped a minimum of 12 inches at all longitudinal and transverse joints. Where seams must be oriented across the slope, the upper panel shall be lapped over the lower panel. If approved, sewn seams may be used instead of overlapped seams.

3.4 PROTECTION

The geotextile shall be protected during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Adequate ballast (e.g. sand bags) shall be used to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

3.5 REPAIRS

Torn or damaged geotextile shall be repaired. Clogged areas of geotextile shall be removed. Repairs shall be performed by placing a patch of the same type of geotextile over the damaged area. The patch shall extend a minimum of 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. The machine direction of the patch shall be aligned with the machine direction of the geotextile being repaired. Geotextile rolls which cannot be repaired shall be removed and replaced. Repairs shall be performed at no additional cost to the Government

3.6 PENETRATIONS

Engineered penetrations of the geotextile shall be constructed [as shown on the drawings] [by methods recommended by the geotextile manufacturer].

3.7 COVERING

Geotextile shall not be covered prior to inspection and approval by the Contracting Officer. Cover soil shall be placed in a manner that prevents soil from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding

over onto themselves. On side slopes, soil backfill shall be placed from the bottom of the slope upward. Cover soil shall not be dropped onto the geotextile from a height greater than 3 feet. No equipment shall be operated directly on top of the geotextile without approval of the Contracting Officer. Equipment with ground pressures less than 7 psi shall be used to place the first lift over the geotextile. A minimum of 12 inches of soil shall be maintained between full-scale construction equipment and the geotextile.

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SECTION 02620A

SUBDRAINAGE SYSTEM
09/01

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 27/A 27M	(1996) Steel Castings, Carbon, for General Application
ASTM A 47/A 47M	(1999) Ferritic Malleable Iron Castings
ASTM A 48	(1994ael) Gray Iron Castings
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM B 745/B 745M	(1997) Corrugated Aluminum Pipe for Sewers and Drains
ASTM C 14	(1999) Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 55	(1999) Concrete Brick
ASTM C 62	(2000) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 139	(1999) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 150	(1999a) Portland Cement
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM D 3034	(1998) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F 758	(1995) Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F 949	(2000) 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 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-04 Samples

Filter Fabric; G
Pipe for Subdrains

Samples of filter fabric, pipe, and pipe fittings, before starting the work.

SD-07 Certificates

Filter Fabric; G
Pipe for Subdrains; G

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 Concrete Pipe

Concrete pipe shall be Class 3 as indicated and shall conform to ASTM C 14 using ASTM C 150 portland cement Type V.

2.1.2 Perforated Corrugated Aluminum Alloy Pipe

Perforated corrugated aluminum alloy pipe shall conform to ASTM B 745/B 745M, Type III, Class [1] [2]. Sheet thickness of pipe shall be as indicated.

2.1.3 Plastic Pipe

2.1.3.1 Polyvinyl Chloride (PVC) Pipe and Fittings

Polyvinyl chloride (PVC) pipe and fittings shall conform to ASTM D 3034, ASTM F 949, ASTM F 758, Type PS 46.

2.1.3.2 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.

2.2 FILTER FABRIC

Filter fabric shall be a as per specifications 02373 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. 80. AOS is defined as the number of the US Standard sieve having openings closest in size to the filter fabric openings.

2.3 DRAINAGE STRUCTURES

2.3.1 Concrete

Drainage structures shall be precast and H-20 rated, per ASTM C 478.

2.3.2 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.

2.3.3 Manholes and Appurtenances

2.3.3.1 Precast Reinforced Concrete Manhole Risers and Tops

Precast reinforced concrete manhole risers and tops shall conform to ASTM C 478.

2.3.3.2 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.

2.3.3.3 Precast Concrete Manhole Bases

If precast concrete manhole bases are used, the bases shall conform to ASTM C 478 and shall be of such a design as to effect suitable connection with influent and effluent lines and to provide a suitable base structure for riser sections.

2.3.3.4 Brick

Brick shall conform to ASTM C 62, Grade SW, or ASTM C 55, Grade S-I or S-II. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in the amount of not more than 25 percent by volume of cement.

2.3.3.5 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 Class 25 or steel conforming to ASTM A 27/A 27M, Class 65-35. Weight, shape, and size shall be as indicated. Frames and covers not subjected to vehicular traffic or storage may be of malleable iron where indicated. The malleable-iron frames and covers shall conform to ASTM A 47/A 47M and shall be of the weight, shape, and size indicated.

2.3.3.6 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 inchthick 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.

2.4 SUBDRAIN FILTER AND BEDDING MATERIAL

Subdrain filter and bedding material shall be washed sand, sand and gravel, crushed stone, crushed stone screenings, or slag composed of hard, tough, durable particles free from adherent coatings. Filter material shall not contain corrosive agents, organic matter, or soft, friable, thin, or elongated particles and shall be evenly graded between the limits specified in TABLE I. Gradation curves will exhibit no abrupt changes in slope denoting skip or gap grading. Filter materials shall be clean and free

from soil and foreign materials.

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 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. 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 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

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. Brick manholes shall be plastered with 1/2 inch of mortar over the entire outside surface of the walls. Brick for square or rectangular structures shall be laid in stretcher courses with a header course every sixth course. Brick for round structures shall be laid radially with every sixth course laid as a stretcher course. 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 [galvanized] [bituminous coated] corrugated metal 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 Overlaps on Perforated or Slotted Pipes

One layer of filter fabric shall be wrapped around the open graded stone bedding which surrounds the perforated or slotted collector pipes in such a manner that longitudinal overlaps of fabric are in unperforated or unslotted quadrants of the pipes. The overlap shall be at least 2 feet. The fabric shall be secured to the pipe in such a manner that backfill material will not infiltrate through any fabric overlaps.

3.3.1.2 Installation on Open-Joint Pipe

One layer of filter fabric shall be wrapped around open joints. The overlap should be at least 2 inches. The fabric shall be secured to the pipe in such a manner that backfill material will not infiltrate through the overlap or the edges of the fabric to either side of the open joint.

3.3.1.3 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 24 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. Nonperforated Concrete: Pipe shall be laid with 1/8 to 1/4 inch opening between the ends of the pipe or as required by spacing lugs constructed in the pipe. Mortar shall be placed in the joint at three points and pressed firmly into place to hold the pipe securely in line. The mortar shall be the full depth of the bell or groove and approximately 1 inch in width, and shall be located at the third points around the joint with the top point at the center of the pipe. The inside of the pipe shall be free of excess mortar.

3.4 INSTALLATION OF AND BACKFILLING FOR BLIND OR FRENCH DRAINS

Filter material shall be placed as indicated and compacted as specified for cohesionless materials in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Filter material shall extend to a suitable outlet or to an outlet through a pipeline as indicated. Overlying backfill material shall be placed and compacted as specified in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.5 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 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.6 TESTS

3.6.1 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 --

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SECTION 02714A

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07/01

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SECTION 02714A

DRAINAGE LAYER
07/01

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29/C 29M	(1997) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	(1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM E 548	(1994el) 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 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

Waybills and Delivery Tickets

Certified waybills and delivery tickets for all aggregates,

bituminous, and cementitious materials actually used.

SD-06 Test Reports

Sampling and Testing; G, G

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.

1.3 UNIT PRICES

1.3.1 Measurement

1.3.1.1 Aggregate Drainage Layer Material

The quantity of aggregate drainage layer material completed and accepted shall be measured in cubic yards. The volume of aggregate drainage layer material in place and accepted shall be determined by the average job thickness obtained in accordance with paragraph THICKNESS CONTROL and the dimensions indicated.

1.4 SYSTEM DESCRIPTION

The Contractor shall build a drainage layer under the walks as indicated on drawings and the drainage layer shall consist of Rapid Draining Material (RDM)[Open Graded Material stabilized with cement or bituminous].

1.5 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.

1.6 EQUIPMENT

1.6.1 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.

1.6.2 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.

1.6.3 Compaction Equipment

A dual or single smooth 2 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.

1.7 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.

1.8 SAMPLING AND TESTING

1.8.1 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.

1.8.2 Test Methods

1.8.2.1 Sieve Analyses

Sieve analyses shall be made in accordance with ASTM C 117 and ASTM C 136.

1.8.2.2 Soundness Test

Soundness tests shall be made in accordance with ASTM C 88.

1.8.2.3 Los Angeles Abrasion Test

Los Angeles abrasion tests shall be made in accordance with ASTM C 131.

1.8.2.4 Flat or Elongated Particles Tests

Flat and/or elongated particles tests shall be made in accordance with ASTM D 4791.

1.8.2.5 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.

1.8.3 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.

1.8.4 Testing Frequency

1.8.4.1 Aggregate Layer

Field density and moisture content tests shall be performed at a rate of at least one test for every 100 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 100 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 12,000square yards of production.

1.8.5 Approval of Materials

1.8.5.1 Aggregate

The aggregate source shall be selected at least 20 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.

PART 2 PRODUCTS

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.

1.9 Aggregate Quality

The aggregate shall have a soundness loss not greater than 20 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 75 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.

1.10 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
Conform with ASTM Gradation s for #57 Stone and #8 Stone.

PART 3 EXECUTION

2.1 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.

2.2 TEST SECTION

2.2.1 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.

2.3 PLACING

2.3.1 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.

2.3.2 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.

2.4 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.

2.5 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.

2.6 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.

2.7 SMOOTHNESS TEST

The surface of the top lift shall not be flat, without deviation.

2.8 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.

2.9 DEFICIENCIES

2.9.1 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.

2.9.2 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.

2.9.3 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.

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SECTION 02780

CONCRETE BLOCK PAVEMENTS

01/98

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SECTION 02780

CONCRETE BLOCK PAVEMENTS
01/98

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.

ACI INTERNATIONAL (ACI)

ACI 301	(1999) Standard Specifications for Structural Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 67	(1999a) Sampling and Testing Brick and Structural Clay Tile
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 936	(1996) Solid Concrete Interlocking Paving Units
ASTM C 979	(1999) Pigments for Integrally Colored Concrete
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM E 11	(1995) Wire-Cloth 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 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-04 Samples

Concrete Paving Block; G

A sample of five paving blocks prior to the start of the work. Also, a representative sample of not less than 15 blocks as directed by the Contracting Officer, from each lot of 20,000 concrete paving blocks or fraction thereof.

SD-06 Test Reports

Tests, Inspections and Verifications; G

A written report within 7 calendar days after completion of the work, covering the testing required for each lot.

1.3 MAINTENANCE

At the completion of work the Contractor shall provide 1 pallet of paving blocks matching those used in the project. These paving blocks shall be delivered stacked on a pallet.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Bedding

Two separate bedding (stone) gradations shall be used for the bedding layer and in the block joints. Both sand gradations shall consist of crushed stone. Both gradations shall have a minimum L.A. Abrasion of 40 percent when tested in accordance with ASTM C 131. The bedding and jointing shall conform to the following gradations.

Sieve (ASTM E 11)	Percent Passing Bedding #57	Percent Passing Jointing #8
	PER ASTM	PER ASTM

2.1.2 Concrete Paving Block

The concrete paving block shall conform to ASTM C 936, and shall be 3 + inches thick, owner approved color, and matching "UNI Eco_STone' pervious paver by Pavestone, or equal with a maximum of 12 percent open, pervious surface. Pigmentation shall conform to ASTM C 979.

2.1.3 Edge Restraints

2.1.3.1 Cast-in-Place Concrete

The edge restraint shall be portland cement concrete placed with the dimensions shown in the plans. Concrete shall conform to the requirements of ACI 301, except that it shall have a compressive strength of not less than 3000 at 28 days and an entrained air content of not less than 5 old.

2.2 TESTS, INSPECTIONS AND VERIFICATIONS

2.2.1 Paving Block

The Contractor shall conduct the tests prescribed by ASTM C 936 and the following tests on the remaining 13 blocks of each sample from each lot.

2.2.1.1 Freezing and Thawing

Resistance to freezing and thawing shall be determined in accordance with

Section 8 of ASTM C 67 for five blocks. The blocks shall have no breakage and no more than 1.0 percent loss of any individual unit in dry weight when subjected to 50 cycles of freezing and thawing.

2.2.1.2 Dimensional Tolerance

The length and width of each block in the sample shall not vary from any other block in this or any other lot sample by more than 1/8 inch. Thickness of any block in the sample shall not vary by more than 1/8 inch from the specified block thickness.

2.2.1.3 Retest

The Contractor shall notify the Contracting Officer if any blocks fail to meet the specified requirements. In case the shipment fails to conform to the specified requirements, the Contractor may sort it, and new specimens shall be selected by the Contractor from the retained lot for retesting, as directed by the Contracting Officer. All concrete paving block retests shall be performed at the expense of the Contractor. In case the second set of specimens fail to conform to the test requirements, the entire lot shall be rejected.

2.2.2 Bedding Stone

The Contractor shall obtain a representative sample in accordance with ASTM D 75 from each 100 cubic yard of sand to be used in the project. If fails to meet the gradation requirements the Contractor may take another sample and retest it at his expense. If this retest fails or if no second test is taken, the sand is rejected by the Government and shall be removed from the job site.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Edge Restraint Location

The edge restraint shall be placed as shown in the drawings and shall be installed prior to placement of the blocks.

3.1.2 Bedding Layer

The bedding shall be spread evenly over the area to be paved and shall be screeded. This bedding shall not be used to fill low areas that exceed the specified tolerance for the base. The sand shall be left uncompacted and shall not be disturbed by any pedestrian or vehicle construction traffic.

3.2 BLOCK PLACEMENT

The paving block shall be placed by hand or machine in the indicated pattern. Placement of paving block shall start from a corner or straight edge and proceed forward over the undisturbed sand bedding layer. The joints, excluding any chamfer between paving blocks, shall be not less than 1/16 inch or more than 1/4 inch in width. After seating, the block surface shall be flush or up to 1/4 inch above the edge restraint.

3.2.1 Unfilled Gaps

Any gaps between paving blocks and any edge restraint, drainage structures,

or other members that cannot be filled with a whole block shall be filled with a paving block cut to fit the gap, except that slivers will not be allowed and the minimum size of cut block shall be 1/2 inches. Cutting shall be done with a hydraulic splitter, a masonry saw, or other device that accurately leaves a clean, vertical face without spalling. Any remaining gap between the block and adjoining edge restraint or structure greater than 1/4 inch will not be accepted; adjacent blocks shall be cut or rearranged to prevent this.

3.2.2 Seating Blocks

The blocks shall be seated in the bedding by compacting them with a minimum of three passes of a vibratory plate compactor.

3.2.3 Jointing Sand

Not used.

3.2.4 Final Rolling

The final finished paving block surface shall be rolled with four passes of a vibratory or pneumatic roller with a static weight of not less than 10,000 pounds.

3.2.5 Construction Traffic

Construction traffic shall not be allowed on the paving block surface until the jointing sand has been placed and vibrated into the joints and all debris and excess sand has been swept off.

3.3 CLEANUP

The Contractor shall sweep the entire pavement surface and remove all excess sand, blocks and debris from the project area.

3.4 SMOOTHNESS AND GRADE TOLERANCES

3.4.1 Smoothness

No portion of the finished pavement surface shall deviate by more than 3/8 inch from a 10 foot long metal straightedge placed on the pavement surface.

3.4.2 Block Height

The finished block surface shall be either flush or up to 1/4 inch higher than all edge restraints or drainage structures.

3.4.3 Grade

The finished pavement shall be within 0.04 feet of planned grade shown on the plans.

3.4.4 Remedial Action

Any area not meeting the smoothness, block height, or grade tolerance shall be taken up, adjustments made, and the blocks relaid.

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SECTION 02821A

FENCING
02/02

PART 1 GENERAL

1.1 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-07 Certificates

Wood Posts; G

Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

PART 2 PRODUCTS

2.1 Wood Posts

2.1.1 Wood Posts for Wood Rail Fence, and Rails

Posts shall consists of Fort Bragg Standards posts installed to depth, height, diameter, and spacing indicated on the plans, per the IDG Base Standards. Installation shall include the fabrication ad/or attachment of hardware, fastness, fabrication of appurentures on or through as necessary for the erection or attachment of any fixtures to the posts as shown on the plans.

2.1.2 Guy Cables

Guy cables shall be prestressed, galvanized wire rope of the sizes indicated. Wire rope shall conform to ASTM A 475, high strength grade with Class A coating. Guys shall have a factory attached clevis top-end fitting; guys shall have a factory attached open-bridge strand socket bottom-end fitting; guys shall be complete with oval eye, threaded anchor rods. Fittings and accessories shall be hot-dip galvanized.

PART 3 EXECUTION

3.1 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary.

3.2 POST INSTALLATION

3.2.1 Posts

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Group II line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Driven posts shall be set to a minimum depth of 3 feet and shall be protected with drive caps when being set..

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SECTION 02915A

TRANSPLANTING EXTERIOR PLANT MATERIAL
01/02

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 in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300	(1995) Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance

AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA)

ANLA Z60.1	(1996) Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 3776	(1996) Mass Per Unit Area (Weight) of Fabric
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1997) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2000) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2001) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 4972	(2001) pH of Soils
ASTM D 5034	(1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D 5035	(1995) Breaking Force and Elongation of Textile Fabrics (Strip Method)

ASTM D 5268	(1992; R 1997) Topsoil Used for Landscaping Purposes
ASTM D 5883	(1996el) Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 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-02 Shop Drawings

Finished Grade and Topsoil; G
Underground Utilities; G
Delivered Topsoil; G
Obstructions Below Ground; G

Finished grade status; location of underground utilities and facilities; and availability of topsoil from the stripping and stock piling operation.

SD-03 Product Data

Polymers
Root Barriers; G

Transplanting Plan; G

Methods to be used for each plant species to be transplanted ensuring survivability.

1.3 TRANSPLANTING PLAN

A transplanting plan shall be submitted and shall delineate methods and times for root pruning, digging, balling, removing, storing, transporting, planting, watering, and maintenance to ensure survivability. The plan shall also include equipment, anti-desiccant and pesticides to be used. A listing of the plant material to be transplanted shall be provided by common name and botanical name as listed under "Nomenclature" in ANLA Z60.1; classification; caliper; and height.

1.4 PLANT MATERIAL SURVIVABILITY

Plant material survivability shall be determined by growing condition; root pruning and transplanting method to maintain a healthy root system; and recovery of leaves or needles with the crown in good balance with the trunk free from disfigurement or abrasion.

1.5 DECIDUOUS TREES

A "P1" height to caliper relationship shall be maintained in accordance with ANLA Z60.1. Height of branching shall bear a relationship to the size and species of tree and with the crown in good balance with the trunk. The

trees shall not be "poled" or the leader removed.

1.5.1 Single stem

The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader. The form of growth desired shall be as indicated.

1.5.1.1 Multi-stem

All countable stems, in aggregate, shall be maintained. To be considered a stem, there shall be no division of the trunk which branches a minimum 6 inches from the ground surface. The form of growth desired shall be as indicated.

1.5.1.2 Specimen

The tree shall be well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

1.5.2 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANLA Z60.1. Plant material shall bear a relationship to the size and species of plant with the crown in good balance with the trunk, well shaped, and with sufficient well-spaced side branches. The form of growth desired shall be as indicated.

1.5.3 Coniferous Evergreen Plant Material

Coniferous evergreen plant material shall have the height-to-spread ratio recommended by ANLA Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Plant material shall be well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

1.5.4 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANLA Z60.1. Plant material shall bear a relationship to the size and species of plant with the crown in good balance with the trunk, well shaped, and with sufficient well-spaced side branches. The form of growth desired shall be as indicated.

1.5.5 Ground Cover and Vines

Ground cover and vine plant material shall have the minimum number of runners and length of runner recommended by ANLA Z60.1. Plant material shall have heavy, well developed and balanced crown with vigorous, well developed root system. The form of growth desired shall be as indicated.

1.5.6 Protection During Transplanting

Plant material shall be protected during transplanting to prevent desiccation and damage to the branches, trunk, and root system. Branches shall be protected by tying-in. Exposed branches shall be covered during transport. The root area shall be treated with gels containing mycorrhizal fungi inoculum. Plant material shall be undamaged, well shaped, vigorous and healthy with a well-branched root system, free from disease, harmful

insects and insect eggs, sun-scald injury, disfigurement or abrasion after transplanting. Plant material showing desiccation, abrasion, sun scald injury or structural branching damage shall be replaced at no cost to the government.

1.6 DELIVERY OF MATERIALS

1.6.1 Delivered Topsoil

Prior to the delivery of any topsoil, the availability of topsoil shall be verified in paragraph TOPSOIL. A soil test shall be provided for delivered topsoil.

1.6.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.6.3 Pesticide Material

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration number and the manufacturer's registered uses.

1.7 PLANT MATERIAL IDENTIFICATION

Plant material to be transplanted shall be tagged and/or shown on drawings. Transplanted plant material shall be delivered with attached, durable, waterproof labels and weather-resistant ink or imprinted tags, stating the correct botanical plant name and size.

1.8 INSPECTION OF MATERIALS

Materials shall be inspected for compliance with paragraph PRODUCTS, paragraph PLANT MATERIAL SURVIVABILITY and paragraph PLANT MATERIAL IDENTIFICATION. Open soil amendment containers or wet soil amendments shall be rejected. Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material larger than 1-1/2 inch diameter shall be rejected. Topsoil that contains viable plant material and plant parts shall be rejected. Unacceptable material shall be removed from the job site.

1.9 STORAGE OF MATERIALS

Storage of material shall be in designated areas. Soil amendments shall be stored in dry locations and away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with planting operation material.

1.10 HANDLING OF MATERIALS

Materials shall not be dropped from vehicles. Plant material shall be transported without scarring trunks or deforming crown branching. Materials found to be in unacceptable condition shall be replaced at no additional cost to the Government.

1.11 TIME LIMITATION

The time limitation from digging, removing, transporting, to installing transplanted plant material shall be the same day. The time limitation between installing the plant material and placing the mulch shall be a maximum 48 hours.

1.12 WARRANTY

Transplanted plant material shall have a warranty for survivability as defined in paragraph PLANT MATERIAL SURVIVABILITY, and plant growth to be in a vigorous growing condition for a minimum 6 month period for plants other than specimen trees and a minimum 12 month calendar time period for specimen trees. The warranty of plant growth shall be provided regardless of the contract time period. When the transplanted plant material is determined to be unhealthy in accordance with paragraph PLANT ESTABLISHMENT PERIOD, it shall be replaced once under this warranty.

PART 2 PRODUCTS

2.1 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02300A EARTHWORK. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the plant material specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

2.2 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite is not permitted.

2.2.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.2.2 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.2.3 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.2.4 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 35 percent shall pass through a No. 60 sieve.

2.2.5 Fertilizer

Fertilizer shall be controlled release, commercial grade, suitable for use on newly transplanted plant material; free flowing, pellet or tablet form; uniform in composition; and consistent with a prescribed nitrogen-phosphorus-potassium ratio.

2.2.6 Organic Material

Organic material shall consist of mature material, not subject to odor when saturated or ponded.

2.2.7 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for single use or in combination to meet topsoil requirements for the plant material specified.

2.2.7.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.2.7.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized at a maximum 1000 microns. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide with an absorption capacity of a minimum 250 to a maximum 400 times its weight.

2.2.7.3 Calcined Clay

Granular particles shall be produced from montmorillonite clay calcined to a minimum temperature of 1200 degrees F. Gradation: A minimum 90 percent passing No. 8 sieve; a minimum 99 percent shall be retained on No. 60 sieve; and a maximum 2 percent shall pass a No. 100 sieve. Bulk density: A maximum 40 pounds per cubic foot.

2.2.7.4 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.2.7.5 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.3 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. Rotted manure is not

recommended to be used as a mulch because it would encourage surface rooting of the plant material and weeds.

2.3.1 Wood Chips and Ground Bark

Locally chipped or ground material shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2 inch wide by 4 inch long. The material may be a by-product of "sustainable practices" such as tree farm trimming.

2.4 GEOSYNTHETICS

Geosynthetics shall be defined as a product manufactured in accordance with ASTM D 3776, ASTM D 4491, ASTM D 4533, ASTM D 4632, ASTM D 4751, ASTM D 4833 and ASTM D 4873, ASTM D 5034 or ASTM D 5035. It shall be referred to as products manufactured for use as weed barriers, drainage matting, root barriers, or soil enhancement systems.

2.5 WOOD STAKING MATERIAL

Wood stakes shall be hardwood or fir; a minimum No. 2 grade, rough sawn; free from knots, rot, cross grain, or other defects that would impair their strength.

2.5.1 Bracing Stake

Wood bracing stakes shall be a minimum 2 x 2 inch square and a minimum 8 feet long with a point at one end. Stake shall be set without damaging rootball.

2.5.2 Wood Ground Stakes

Wood ground stakes shall be a minimum of 2 x 2 inch square and a minimum 3 feet long with a point at one end.

2.5.3 Deadmen

Wood deadmen shall be a minimum 4 x 4 x 36 inches long.

2.6 METAL STAKING AND GUYING MATERIAL

Metal shall be aluminum or steel consisting of recycled content made for holding plant material in place.

2.6.1 Bracing Stakes

Metal bracing stakes may be hollow or solid and shall be a minimum 1 inch diameter and a minimum 8 feet long. Stake shall be set without damaging rootball and be capable of supporting the tree adequately.

2.6.2 Metal Ground Stakes

Metal ground stakes shall be a minimum 1/2 inch diameter and a minimum 3 feet long.

2.6.3 Earth Anchor

Metal earth anchors shall be a minimum 1/2 inch diameter and a minimum 2 feet long.

2.6.4 Guying Material

Metal guying material shall be a minimum 12 gauge wire. Multi-strand cable shall be woven wire. Guying material tensile strength shall conform to the size of tree to be held firmly in place.

2.6.5 Turnbuckle

Metal turnbuckles shall be galvanized or cadmium-plated steel, and shall be a minimum 3 inches long with closed screw eyes on each end. Screw thread tensile strength shall conform to the size of tree to be held firmly in place.

2.7 PLASTIC STAKING AND GUYING MATERIAL

Plastic shall consist of recycled plastic product made for holding plant material firmly in place. Plastic shall not be used for deadmen.

2.7.1 Plastic Bracing Stake

Plastic bracing stakes shall be a minimum 2 inch diameter and a minimum 8 feet long. Stake shall be set without damaging rootball.

2.7.2 Plastic Ground Stakes

Plastic ground stakes shall be a minimum 2 inch diameter and a minimum 3 feet long.

2.7.3 Plastic Guying Material

Plastic guying material shall be designed with a maximum 900 pound force per foot elastic limit for the purpose of firmly holding plant material in high wind velocities.

2.7.4 Chafing Guard

Plastic chafing guards shall be used to protect tree trunks and branches when metal is used as guying material. The material shall be the same color throughout the project site. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

2.8 RUBBER GUYING MATERIAL

Rubber chafing guards, consisting of recycled material, shall be used to protect tree trunks and branches when metal guying material is applied. The material shall be the same color throughout the project. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

2.9 FLAG

Plastic flag material shall be used on guying material. It shall be a minimum 6 inches long. Tape color shall be consistent and visually complimentary to the entire project area. The tape color shall meet pedestrian visual safety requirements for day and night.

2.10 TREE ROOT BARRIERS

Tree root barriers shall be metal or plastic consisting of recycled

content. Barriers shall utilize vertical stabilizing members to encourage downward tree root growth. Barriers shall limit, by a minimum 90 percent, the occurrence of surface roots. Tree root barriers which are designed to be used as plant pit liners will be rejected.

2.11 MYCORRHIZAL FUNGI INOCULUM

Mycorrhizal fungi inoculum shall be composed of multiple-fungus inoculum as recommended by the manufacturer for the plant material specified.

2.12 WATER

Unless otherwise directed, water shall be the responsibility of the Contractor. Water shall be potable or supplied by an existing irrigation system.

2.13 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 EXECUTION

3.1 TRANSPLANTED PLANT MATERIAL TIME AND CONDITIONS

3.1.1 Transplanting Conditions

All transplanting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to all transplanting operations, proposed transplanting times shall be submitted for approval. The installing site for the plant material shall be prepared and excavated in accordance with paragraph INSTALLING SITE PREPARATION and paragraph INSTALLING SITE EXCAVATION, prior to removing the plant material.

3.1.2 Underground Utilities

The location of underground utilities and facilities at both the removal and installing sites shall be verified and marked. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.1.3 Protecting Existing Vegetation

When there are established lawns at both the removal and installing sites, the turf shall be covered and/or protected during the operation. Existing trees, shrubs, and plant beds at both the removal and installing site that are to be preserved shall be barricaded along the dripline. The area shall be barricaded and protected from damage by a tree barricade or other measure. Damage to existing plant material shall be mitigated by the Contractor at no additional cost to the Government. Damage shall be accessed by a state certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

3.1.4 Installing Site Tests

3.1.4.1 Percolation Test

Test for percolation shall be done to determine positive drainage of plant pits and beds at the installing site. A positive percolation shall consist of a minimum 1 inch per 3 hours; when a negative percolation test occurs, a shop drawing shall be submitted indicating the corrective measures.

3.1.4.2 Soil Test

Delivered topsoil, excavated plant pit soil, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection onsite shall be random over the entire installing site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the plant material to be transplanted.

3.1.5 Plant Material Preparation and Handling

3.1.5.1 Root Pruning

Large canopy and specimen plant material shall be root pruned a minimum of one year before transplanting. Minimum root ball sizes shall be in accordance with ANLA Z60.1. Medium sized plant material shall be spaded or hand dug prior to removal. A sharp spade shall be used to cut straight down a minimum of 18 inches deep.

3.1.5.2 Plant Material Preparation

Plant material designated for transplanting shall be watered thoroughly several days before root pruning, digging or moving. Broken or interfering growth shall be pruned. Large canopy and specimen plant material shall be wire balled and burlapped. Trees shall be lifted by the use of tree straps. Canopy and evergreen trees up to a maximum 12 inches caliper shall be transplanted by the largest available tree spade in order to reduce shock. The installing site for the plant material shall be prepared and excavated in accordance with paragraphs: Transplanting Plant Material Time and Conditions, Installing Site Preparation, and Installing Site Excavation, prior to moving the plant material.

3.1.5.3 Tree Spading

The following minimum size spades shall be used for trees sized as measured at caliper; 6 inches above the ground for trees 4 inches in diameter or smaller, 12 inches above the ground for trees with a larger diameter.

Tree Spade Size	Deciduous Tree	Evergreen Tree
Minimum 44 inch	Minimum 2 inch to Maximum 3 inch caliper	Minimum 5 feet to Maximum 7 feet height
Minimum 66 inch	Minimum 3 inch to Maximum 5 inch caliper	Minimum 7 feet to Maximum 10 feet height

Tree Spade Size	Deciduous Tree	Evergreen Tree
Minimum 85 inch	Minimum 6 inch to Maximum 8 inch caliper	Minimum 12 feet to Maximum 15 feet height

3.1.5.4 Caliper

The caliper shall be measured at a minimum 6 inch height above the ground surface for trees up to a maximum 4 inch caliper. The caliper shall be measured at a minimum 12 inch height above the ground surface for trees with a larger caliper.

3.2 INSTALLING SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section 02300A EARTHWORK, prior to the commencement of the transplanting operation.

3.2.2 Layout

Plant material installing sites and bed outlines shall be staked on the project site before any excavation is made. Plant material locations may be adjusted to meet field conditions.

3.3 INSTALLING SITE EXCAVATION

3.3.1 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to plant material location, and planting method shall be submitted for approval.

3.3.2 Turf Removal and Replacement

Where the installation operation occurs in an existing lawn area, the turf shall be removed from the excavation area to a depth that will ensure the removal of the entire root system.

3.3.3 Plant Pits

Plant pits shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits shall be dug a minimum of 3 to a maximum 5 times the diameter of the root system to allow for root expansion. The pit shall be constructed with sides sloping towards the base as a cone, to encourage well-aerated soil to be available to the root system for favorable root growth. Cylindrical pits with vertical sides shall not be used. Pits shall be dug immediately before plants are placed in the pit.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient soil has been firmly placed around root system or ball. In relation to the

surrounding grade, the plant material shall be set even with the grade at which it was grown. The root system shall be spread out and arranged in its natural position. Damaged or girdled roots shall be removed with a clean cut. The beginning of the root flare shall be visible at soil level when the tree is planted, since it is critical not to plant the tree too deep. The following shall be performed:

a. Plumb tree and backfill half of the hole.
b. Water the hole to collapse air pockets and form a soupy mixture.
c. Backfill and gently firm soil.
d. Clear soil mounded against trunk.

3.4.2 Root Barriers

Tree root barriers shall be installed as indicated in the contract documents and as recommended by the manufacturer. Tree root barriers shall be used for trees located up to a maximum 6 feet from paved surfaces or structures.

3.4.3 Backfill Soil Mixture

The backfill soil mixture may be a mix of topsoil and soil amendments suitable for the plant material specified. When practical, the excavated soil from the plant pit that is not amended provides the best backfill and shall be used. Fertilizer shall not be used in the backfill soil mixture.

3.4.4 Adding Mycorrhizal Fungi Inoculum

Mycorrhizal fungi inoculum shall be added as recommended by the manufacturer for the plant material specified.

3.4.5 Backfill Procedure

Prior to backfilling, all metal, wood, synthetic products, or treated burlap devices shall be removed from the ball or root system avoiding damage to the root system. The backfill procedure shall remove air pockets from around the root system. Biodegradable burlap and tying material shall be carefully opened and folded back from the top a minimum 1/3 depth from the top of the root ball. For plant material in biodegradable containers the container shall be split prior to setting the plant with container. The plant material shall be carefully removed from containers that are not biodegradable.

3.4.5.1 Earth Berm

An earth berm, consisting of backfill soil mixture, shall be formed with a minimum 4 inch height around the edge of the plant pit to aid in water retention and to provide soil for settling adjustments.

3.4.6 Plant Bed

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas. Earth berms shall be provided. Polymers shall be spread uniformly over the plant bed and in the planting pit as recommended by the manufacturer and thoroughly incorporated into the soil to a maximum 4 inch depth.

3.4.7 Watering

A regular watering schedule shall be established. Slow deep watering shall be used. Plant pits and plant beds shall be watered immediately after backfilling, until completely saturated. Run-off and puddling shall be prevented. Watering of other plant material or adjacent areas shall be prevented.

3.4.8 Staking and Guying

Staking will be required when trees are unstable or will not remain set due to their size, shape, or exposure to high wind velocity.

3.4.8.1 One Bracing Stake

Trees 4 to 6 feet high shall be firmly anchored in place with one bracing stake. The bracing stake shall be placed on the side of the tree facing the prevailing wind. The bracing stake shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly to the stake with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. A chafing guard shall be used when metal is the guying material.

3.4.8.2 Two Bracing Stakes

Trees from 6 to 8 feet height shall be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly between the stakes with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Chafing guards shall be used when metal is the guying material.

3.4.8.3 Three Ground Stakes

Trees over a minimum 8 feet height and less than a maximum 6 inch caliper shall be held firmly in place with 3 bracing or ground stakes spaced at equal intervals around the tree. Ground stakes shall be avoided in areas to be mowed. Stakes shall be driven into firm ground outside the earth berm. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. For trees over a minimum 3 inch diameter at breast height, turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used when metal is the guying material.

3.4.9 Deadmen or Earth Anchors

Trees over a minimum 6 inch caliper shall be held firmly in place with wood deadmen buried a minimum 3 feet in the ground or metal earth anchors. Multi-strand cable guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used.

3.4.10 Flags

A flag shall be securely fastened to each guy line between the tree, stake, deadmen, or earth anchor. The flag shall be visible to pedestrians.

3.5 FINISHING

3.5.1 Plant Material

Prior to placing mulch, the installed area shall be uniformly edged to provide a clear division line between the planted area and the adjacent turf area, shaped as indicated. The installed area shall be raked and smoothed while maintaining the earth berms.

3.5.2 Placing Geosynthetics

Prior to placing mulch, geosynthetics shall be placed as indicated in the construction documents and in accordance with the manufacturer's recommendations.

3.5.3 Placing Mulch

The placement of mulch shall occur a maximum of 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and prevent weed growth, shall be spread to cover the installed area with a minimum 4 inch uniform thickness. Mulch shall be kept out of the crowns of shrubs, ground cover, and vines and shall be kept off buildings, sidewalks and other facilities.

3.5.4 Pruning

Pruning shall be accomplished by trained and experienced personnel. The pruning of trees and palms shall be in accordance with ANSI A300. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off".

3.6 MAINTENANCE DURING TRANSPLANTING OPERATION

Installed plant material shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed to prevent desiccation and shall continue until the plant establishment period commences. Installed areas shall be kept free of weeds, grass, and other undesired vegetation. The maintenance includes maintaining the mulch, watering, and adjusting settling.

3.7 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.7.1 Technical Representative

The certified, installation pest management coordinator shall be the technical representative, shall be present at all meetings concerning treatment measures for pest or disease control,and may be present during treatment application.

3.7.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.8 RESTORATION AND CLEAN UP

3.8.1 Restoration

Turf areas containing ruts or dead turf, as a result of work under this contract, shall be graded smooth and sodded with the same species. All pavements and facilities that have been damaged from the transplanting operation shall be restored to original condition at the Contractor's expense.

3.8.2 Backfill Removal Site Plant Pits

The Contractor shall ensure that all remaining holes from the removal site have been backfilled, tamped and finished to meet existing grade after settling. Turf shall be installed in accordance with [Section 02921A SEEDING] [or] [Section 02922A SODDING].

3.8.3 Clean Up

Excess and waste material shall be removed from both removal site and the installed site and shall be disposed offsite at an approved landfill or recycling center. Adjacent paved areas shall be cleared.

3.9 PLANT ESTABLISHMENT PERIOD

3.9.1 Commencement

The plant establishment period for maintaining installed plant material in a healthy growing condition shall commence on the first day of transplanting work under this contract and shall continue through the remaining life of the contract end [3] [4] [6] [12] months after the last day of transplanting required by this contract. Written calendar time period shall be furnished for the plant establishment period. When there is more than one plant establishment period, the boundaries of the planted area covered for each period shall be described. The plant establishment period shall be coordinated with Sections 02921A SEEDING; 02922A SODDING; 02923A SPRIGGING and 02930A EXTERIOR PLANTING. The plant establishment period shall be modified for separate completion dates for areas.

3.9.2 Maintenance During Establishment Period

Maintenance of plant material shall include straightening plant material, straightening stakes; tightening guying material; correcting girdling; supplementing mulch; pruning dead or broken branch tips; maintaining plant material labels; watering; eradicating weeds, insects and disease; post-fertilization; and removing and replacing unhealthy plants.The plant

material shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of 1 inch absorbed water per week, delivered in the form of rain or augmented by watering. Run-off, puddling and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or existing plant material shall be prevented.

3.9.2.1 Weeding

Grass and weeds in the installed areas shall not be allowed to reach a maximum 3 inches height before being completely removed, including the root system.

3.9.2.2 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.2.3 Post-Fertilization

The plant material shall be top dressed at least once during the period of establishment with controlled release fertilizer (paragraph SOIL AMENDMENTS) applied at the rate of 2 pounds per 100 square feet of plant pit or bed area. Dry fertilizer adhering to plants shall be flushed off. The application shall be timed prior to the advent of winter dormancy.

3.9.2.4 Plant Pit Settling

When settling occurs to the backfill soil mixture, additional backfill soil shall be added to the plant pit or plant bed until the backfill level is equal to the surrounding grade. Serious settling that affects the setting of the plant in relation to the maximum depth at which it was grown requires replanting in accordance with paragraph INSTALLATION. The earth berm shall be maintained.

3.9.2.5 Removal Site Settlement

All plant pits at the removal site shall meet existing grade after settling. Correction shall be provided as required and in accordance with paragraph BACKFILL REMOVAL SITE PLANT PITS.

3.9.2.6 Maintenance Record

A record shall be furnished describing the maintenance work performed, the quantity of plant losses, diagnosis of the plant loss, and the quantity of replacements made on each site visit.

3.9.3 Acceptable Plant Material

Plant material shall be undamaged, well shaped, vigorous and healthy with a well branched root system, free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion after transplanting and in accordance with paragraph PLANT MATERIAL SURVIVABILITY. Plant material showing desiccation, abrasion, sun-scald injury or structural branching damage shall be replaced at no cost to the Government.

3.9.4 Unhealthy Or Dead Plant Material

3.9.4.1 Transplant Shock

Deciduous plants showing symptoms of leaf scorch, a yellowing or bronzing of the tissue between the veins or along the margins of leaves or wilting; leaf rolling or curling may be need to be replaced, if required by the Contracting Officer. Evergreen plant stress is exhibited by overall grey-green color followed by light tan. The Contractor shall evaluate the severity of the symptom and shall provide recommendations.

3.9.4.2 Dead Plant Material

A tree shall be considered dead when the main leader has died back, or up to a maximum 25 percent of the crown has died. A shrub shall be considered unhealthy or dead when up to a maximum 25 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine if there is a green cambium layer below the bark. The Contractor shall determine the cause for dead plant material and shall provide recommendations for replacement. Dead plant material shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

3.9.4.3 Replacement Plant Material

Replacement plant material shall be installed in accordance with paragraph INSTALLATION. Plant material shall be replaced in accordance with paragraph WARRANTY. An extended plant establishment period shall not be required for replacement plant material.

3.9.5 Maintenance Instructions

Written instructions shall be furnished containing drawings and other necessary information for year-round care of the installed plant material; including, when and where maintenance should occur, and the procedures for plant material replacement.

3.9.6 End of Establishment Period Clean Up

The Contractor shall remove all guying, bracing and staking at the end the establishment period with the approval of the Contracting Officer. All materials removed as a result of this operation shall be disposed offsite at an approved landfill. Any damage resulting from this operation shall be restored to its original condition at the Contractor's expense.

-- End of Section --

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DIVISION 02 - SITE CONSTRUCTION

SECTION 02921B

EROSION CONTROL AND TURF SEEDING

12/97

-- End of Section Table of Contents --

SECTION 02921B

EROSION CONTROL AND TURF SEEDING
12/97

DESCRIPTION OF WORK: This work shall consist of complete ground preparation and establishment of a permanent cover of grass on all open earth areas and all disturbed areas within the limits of construction. The work shall conform to this specification and shall be carefully coordinated with the site grading operations and erosion control work shown on the drawings and/or as covered in the specifications.

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.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS Seed Act (1995) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602 (1995a) Agricultural Liming Materials

ASTM D 977 (1998) Emulsified Asphalt

STATE OF NORTH CAROLINA

North Carolina Seed Law
North Carolina Commercial Fertilizer Law
North Carolina Liming Materials and Landplaster Act
North Carolina Department of Transportation Standard Specifications for Roads and Structures, 1984 or Later Edition

1.2 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-07 Certificates

Seed; GA

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

Seed. Classification, botanical name, common name, percent pure live

seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

SD-11 Closeout Submittals

Records and Test Data, Quality Control; FIO

1.3 OMITTED.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Omitted.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.3 Omitted.

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments shall be rejected. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants.

1.4.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for

percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with the AMS Seed Act and applicable state seed laws.

2.1.2 Permanent Seed Species, Mixtures and Rates of Application

Erosion Control Mix, March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Paspalum notatum	Pensacola Bahiagrass	50
Cynodon dactylon	Common Bermudagrass (hulled)	10
Lespedeza striata	Kobe Lespedeza	35
Setaria italica	German Millet	25

Erosion Control Mix, September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Paspalum notatum	Pensacola Bahiagrass	50
Cynodon dactylon	Common Bermudagrass (hulled)	5
Cynodon dactylon	Common Bermudagrass (unhulled)	5
Lespedeza striata	Kobe Lespedeza	35
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	25

Turf Mix, March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Cynodon dactylon (unhulled is acceptable, but not required)	Common Bermudagrass	100
Setaria italica	German Millet	25

Turf Mix, September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Cynodon dactylon	Common Bermudagrass (hulled)	50
Cynodon dactylon	Common Bermudagrass (unhulled)	50
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	25

2.1.3 Temporary Seed Species

Temporary seed species and rates for surface erosion control or turfed areas shall be as follows.

March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Setaria italica	German Millet	50

September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	50

2.1.4 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.1.5 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 OMITTED.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of lime and fertilizer meeting the following requirements.

2.3.1 Lime

Lime shall be agricultural grade, dolomitic limestone meeting requirements of the North Carolina Liming Materials and Landplaster Act and of ASTM C 602.

2.3.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and shall conform to applicable state regulations. Granular fertilizer shall conform to the North Carolina Commercial Fertilizer Law and shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 10 percent nitrogen, 20 percent phosphoric acid, and 20 percent potash. When slow release nitrogen forms are used in the fertilizer mixture, they shall be derived from sulfur coated urea, urea formaldehyde, plastic or polymer coated prills, or isobutylene diurea. Upon approval by the Contracting Officer, a different analysis of fertilizer may be used, provided the 1 2 2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10 20 20 analysis.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.4.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.4.3 Wood Cellulose Fiber

Wood cellulose fiber mulch shall be used only in hydroseeding applications. It shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.4.4 Paper Fiber

Paper fiber mulch shall be used only in hydroseeding applications. It shall be recycled news print that is shredded for the purpose of mulching seed.

2.5 ASPHALT ADHESIVE

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1; or to North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures, grade CRS-1 or CRS-1H.

2.6 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

2.7 OMITTED.

2.8 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.8.1 Surface Erosion Control Straw or Excelsior Blanket

2.8.1.1 Straw Net Blanket

Straw blanket material manufactured for erosion control purposes. It shall be produced of 100% agriculture straw. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

2.8.1.2 Excelsior Blanket

Blanket shall be machine produced mat of wood excelsior formed from a web of interlocking wood fibers; covered on one side with either knitted straw blanket-like mat construction; covered with biodegradable plastic mesh; or interwoven biodegradable thread, plastic netting, or twisted kraft paper cord netting.

2.8.2 Surface Erosion Control Coconut Fiber Blanket

Coconut fiber erosion control blanket material manufactured for erosion control purposes. It shall be produced of 100% coconut fiber. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2

inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

2.8.3 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from March 1 through August 31 for summer establishment; and from September 1 through February 28 for winter establishment, in accordance with paragraph SEED.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.2 SITE PREPARATION

3.2.1 Finished Grade

The Contractor shall verify that finished grades are as indicated on drawings, and that smooth grading and compaction requirements have been completed prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying Lime

The application rate shall be 2000 pounds per acre. Lime shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The application rate shall be 400 pounds per acre. Fertilizer shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation. An additional 400 pounds per acre shall be applied after acceptance of permanent grass in accordance with paragraph POST-FERTILIZATION.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by

construction operations shall be completely pulverized by tillage. Existing dirt trails and open areas which are to be planted with pines shall be tilled for the top 12 inches. Lime and fertilizer may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Turf Area Debris

Debris and stones over a minimum 5/8 inch in any dimension shall be removed from the surface.

3.2.4.3 Erosion Control Area Debris

Debris and stones over a minimum 3 inches in any dimension shall be removed from the surface.

3.2.4.4 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be Broadcast Seeding, Drill Seeding, or Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. If used, absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate shown in paragraph SEED, using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 1/4 inch depth by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.1.2 Drill Seeding

Seed shall be uniformly drilled to a maximum 1/2 inch depth and at the rate shown in paragraph SEED, using equipment having drills a maximum 7 inches distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction.

The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

3.3.1.3 Rolling

The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rates shown in paragraph SEED. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified, or fertilizer may be applied separately in accordance with paragraph SITE PREPARATION. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Half of the wood cellulose or paper fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. The remaining half of the mulch and tackifier shall be mixed and applied in a second application. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

3.3.3 Mulching

3.3.3.1 Hay or Straw Mulch

Straw mulch shall be spread uniformly at the rate of 2 tons per acre. Hay mulch shall be spread uniformly at the rate of 3 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.3.3.3 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be sprayed at a rate between 10 to 13 gallons per 1000 square feet. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber or recycled paper fiber shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3.4 Watering Seed

Watering shall be started immediately after completing the seeding of an

area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

3.4.2 Temporary Seeding

Bare or disturbed areas that will be left over 15 days, or areas where directed during contract delays affecting the seeding operation, shall be seeded in accordance with temporary seed species and rates listed under paragraph SEED.

3.5 OMITTED

3.6 OMITTED

3.7 RESTORATION AND CLEAN UP

3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.7.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.9 SEED ESTABLISHMENT PERIOD

3.9.1 Quality Control

During construction, an established system of quality control shall be maintained. To assure compliance with contract requirements and the maintenance of records of all materials, equipment, and construction operations, quality control shall include but not be limited to the following:

Seeding -- Specified species planted at proper rates; preparation of planting bed as to thoroughness of tillage, leveling and depth of planting.

Mulching -- Types and rates of application.

Satisfactory stand of grass -- Coverage of the planted species at the end of the specified growth period, and the maintenance procedures, including supplemental fertilization.

A copy of all records and test data required herein, and the records of corrective action taken, shall be furnished the Contracting Officer.

3.9.2 Satisfactory Stand of Grass Plants, Turf or Erosion Control Area

A stand of turf is considered acceptable when the new growing sprouts of permanent grass are visible at the surface showing not less than 20 seedlings of permanent grass at least 2 inches long in each square foot, where no gaps larger than 4 inches in diameter occur anywhere in the seeded area, and where the total bare spots do not exceed 2 percent of the total seeded area. Permanent grass is defined as Common Bermuda or Pensacola Bahia.

3.9.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.9.3.1 Mowing

a. Turf Areas: Turf areas shall be mowed to a minimum 3 inch height when the turf is a maximum 4 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

b. Erosion Control Areas: Erosion control areas shall be mowed to a minimum 4 inch height when the plants are a maximum 8 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.9.3.2 Post-Fertilization

After the permanent grass has been accepted, and between the dates of April 15 and October 15, apply 400 pounds of fertilizer per acre.

3.9.3.3 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.3.4 Warranty

There is no 1 year warranty for maintenance after acceptance of grass.

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SECTION 02930A

EXTERIOR PLANTING
01/02

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 in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300	(1995) Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance

AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA)

ANLA Z60.1	(1996) Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 4972	(2001) pH of Soils
ASTM D 5034	(1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D 5035	(1995) Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5268	(1992; R 1997) Topsoil Used for Landscaping Purposes
ASTM D 5883	(1996el) Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 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-02 Shop Drawings

Shop Drawings; G

Scale drawings defining areas to receive plant materials.

Finished Grade, Topsoil and Underground Utilities; G

Finished grade status; location of underground utilities and facilities; and availability of topsoil from the stripping and stock piling operation.

SD-03 Product Data

Geotextile; G
Chemical Treatment Material

Plant Establishment Period; G

SD-04 Samples

Mulch; G

A 10 pound sample.

Geotextile; G

A 6 inch square sample.

1.3 SOURCE INSPECTIONS

The nursery or source of plant material and the source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Plant Material Identification

Plant material shall be identified with attached, durable, waterproof labels and weather-resistant ink, stating the correct botanical plant name and size.

1.4.1.2 Protection During Delivery

Plant material shall be protected during delivery to prevent desiccation and damage to the branches, trunk, root system, or earth ball. Branches shall be protected by tying-in. Exposed branches shall be covered during transport.

1.4.1.3 Delivered Topsoil

Prior to the delivery of any topsoil, the availability of topsoil shall be verified in paragraph TOPSOIL. A soil test shall be provided for delivered topsoil.

1.4.1.4 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis

shall be provided for bulk deliveries.

1.4.1.5 Pesticide Material

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration number and the manufacturer's registered uses.

1.4.2 Inspection

Plant material shall be well shaped, vigorous and healthy with a healthy, well branched root system, free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion. Plant material shall be checked for unauthorized substitution and to establish nursery grown status. Plant material showing desiccation, abrasion, sun-scald injury, disfigurement, or unauthorized substitution shall be rejected. The plant material shall exhibit typical form of branch to height ratio; and meet the caliper and height measurements specified. Plant material that measures less than specified, or has been poled, topped off or headed back, shall be rejected. Container-grown plant material shall show new fibrous roots and the root mass shall contain its shape when removed from the container. Plant material with broken or cracked balls; or broken containers shall be rejected. Bare-root plant material that is not dormant or is showing roots were pulled from the ground shall be rejected. Other materials shall be inspected for compliance with paragraph PRODUCTS. Open soil amendment containers or wet soil amendments shall be rejected. Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material larger than 1-1/2 inch diameter shall be rejected. Topsoil that contains viable plant material and plant parts shall be rejected. Unacceptable material shall be removed from the job site.

1.4.3 Storage

1.4.3.1 Plant Material Storage

Plant material not installed on the day of arrival at the site shall be stored and protected in designated areas. Plant material shall not be stored longer than 30 days. Plant material shall be protected from direct exposure to wind and sun. Bare-root plant material shall be heeled-in. All plant material shall be kept in a moist condition by watering with a fine mist spray until installed.

1.4.3.2 Other Material Storage

Storage of other material shall be in designated areas. Soil amendments shall be stored in dry locations and away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with planting operation material.

1.4.4 Handling

Plant material shall not be injured in handling. Cracking or breaking the earth ball of balled and burlapped plant material shall be avoided. Plant material shall not be handled by the trunk or stems. Materials shall not be dropped from vehicles.

1.4.5 Time Limitation

Except for container-grown plant material, the time limitation from digging

to installing plant material shall be a maximum 90 days. The time limitation between installing the plant material and placing the mulch shall be a maximum 24 hours.

1.5 WARRANTY

Furnished plant material shall have a warranty for plant growth to be in a vigorous growing condition for a minimum 12 month period. A minimum 12 month calendar time period for the warranty of plant growth shall be provided regardless of the contract time period. When plant material is determined to be unhealthy in accordance with paragraph PLANT ESTABLISHMENT PERIOD, it shall be replaced once under this warranty.

PART 2 PRODUCTS

2.1 PLANT MATERIAL

2.1.1 Plant Material Classification

The plant material shall be nursery grown stock conforming to ANLA Z60.1 and shall be the species specified.

2.1.2 Plant Schedule

The plant schedule shall provide botanical names as included in one or more of the publications listed under "Nomenclature" in ANLA Z60.1.

2.1.3 Substitutions

Substitutions will not be permitted without written request and approval from the Contracting Officer.

2.1.4 Quality

Well shaped, well grown, vigorous plant material having healthy and well branched root systems in accordance with ANLA Z60.1 shall be provided. Plant material shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement and abrasion. Plant material shall be free of shock or damage to branches, trunk, or root systems, which may occur from the digging and preparation for shipment, method of shipment, or shipment. Plant quality is determined by the growing conditions; method of shipment to maintain health of the root system; and growth of the trunk and crown as follows.

2.1.5 Growing Conditions

Plant material shall be native to or well-suited to the growing conditions of the project site. Plant material shall be grown under climatic conditions similar to those at the project site.

2.1.6 Method of Shipment to Maintain Health of Root System

2.1.6.1 Balled and Burlapped (BB) Plant Material

Ball size and ratio shall be in accordance with ANLA Z60.1. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. The plant stem or trunk shall be centered in the ball. All roots shall be clean cut at the ball surface. Roots shall not be pulled from the ground. Before shipment

the root ball shall be dipped in gels containing mycorrhizal fungi inoculum. The root ball shall be completely wrapped with burlap or other suitable material and securely laced with biodegradable twine.

2.1.6.2 Balled and Potted (Pot) Plant Material

Ball size and ratio shall be in accordance with ANLA Z60.1. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. Removal shall be done by hand digging or mechanical devices. The plant stem or trunk shall be centered in the ball. All roots shall be clean cut at the ball surface. Roots shall not be pulled from the ground. Before shipment the root ball shall be dipped in gels containing mycorrhizal fungi inoculum. Container shall be used to retain the ball unbroken. Container shall be rigid to hold ball shape and protect root mass during shipping.

2.1.6.3 Balled and Platform (BP) Plant Material

Ball size and ratio shall be in accordance with ANLA Z60.1. Plants shall be prepared as balled and burlapped plant material and securely fastened to wood platform for shipping.

2.1.6.4 Bare-Root (BR) Plant Material

Minimum root spread shall be in accordance with ANLA Z60.1. A well branched root system characteristic of the species specified shall be provided. Roots shall not be pulled from the ground. Bare-root plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. Bare-root plant material shall be dormant. The root system shall be protected from drying out.

2.1.6.5 Container-Grown (C) Plant Material

Container size shall be in accordance with ANLA Z60.1. Plant material shall be grown in a container over a duration of time for new fibrous roots to have developed and for the root mass to retain its shape and hold together when removed from the container. Container-grown plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. The container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

2.1.7 Growth of Trunk and Crown

2.1.7.1 Deciduous Trees

A height to caliper relationship shall be provided in accordance with ANLA Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk which branches more than 6 inches from ground level.

c. Specimen: The tree provided shall be well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

2.1.7.2 Palms

Palms shall have the specified height as measured from the base of the trunk to the base of the fronds or foliage in accordance with ANLA Z60.1. The palm shall have straight trunk and healthy fronds or foliage as typical for the variety grown in the region of the project. Palms trimmed or pruned for delivery shall retain a minimum of 6 inches of foliage at the crown as a means of determining plant health.

2.1.7.3 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANLA Z60.1. Acceptable plant material shall be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

2.1.7.4 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material shall have the height-to-spread ratio recommended by ANLA Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.1.7.5 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANLA Z60.1. Acceptable plant material shall be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.1.7.6 Ground Cover and Vine Plant Material

Ground cover and vine plant material shall have the minimum number of runners and length of runner recommended by ANLA Z60.1. Plant material shall have heavy, well developed and balanced crown with vigorous, well developed root system and shall be furnished in containers.

2.1.8 Plant Material Size

Plant material shall be furnished in sizes indicated. Plant material larger in size than specified may be provided at no additional cost to the Government.

2.1.9 Plant Material Measurement

Plant material measurements shall be in accordance with ANLA Z60.1.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02300A EARTHWORK. When additional topsoil is

required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the plant material specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite is not recommended.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 35 percent shall pass through a No. 60 sieve.

2.3.2 Fertilizer

It shall be as recommended by the soil test. Fertilizer shall be controlled release commercial grade; free flowing, pellet or tablet form; uniform in composition; and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.3 Organic Material

Organic material shall consist of either bonemeal, peat, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.3.1 Bonemeal

Bonemeal shall be a finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2.3.3.2 Rotted Manure

Rotted manure shall be unleached horse, chicken, or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. Manure shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and shall be free of stones, sticks, and soil.

2.3.3.3 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, or other wood waste material free of stones, sticks, and toxic substances harmful to plants, and stabilized with nitrogen.

2.3.3.4 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. It shall be derived from food, agricultural, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent or less by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.3.3.5 Worm Castings

Worm castings shall be screened from worms and food source and shall be commercially packaged.

2.3.4 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for single use or in combination to meet topsoil requirements for the plant material specified.

2.3.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.4.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized according to manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide with an absorption capacity of 250-400 times its weight.

2.3.4.3 Calcined Clay

Granular particles shall be produced from montmorillonite clay calcined to minimum temperature of 1200 degrees F. Gradation: A minimum 90 percent passing No. 8 sieve; a minimum 99 percent shall be retained on No. 60 sieve; and a maximum 2 percent shall pass a No. 100 sieve. Bulk density:

A maximum 40 pounds per cubic foot.

2.3.4.4 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.3.4.5 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. Rotted manure is not recommended to be used as a mulch because it would encourage surface rooting of the plant material and weeds and odiferous where saturated and ponded.

2.4.1 Organic Mulch

Organic mulch materials shall be native to the project site and consist of recycled mulch, shredded bark, wood chips, or ground bark.

2.4.1.1 Recycled Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 2-1/2 x 2-1/2 inch screen. It shall be cleaned of all sticks a minimum 1 inch in diameter and plastic materials a minimum 3 inch length. The material shall be treated to retard the growth of mold and fungi. Other recycled mulch may include peanut shells, pecan shells or coco bean shells.

2.4.1.2 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.4.1.3 Wood Chips and Ground Bark

Locally chipped or ground material shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2 inch wide by 4 inch long.

2.5 GEOTEXTILE

Geotextile shall be woven or nonwoven; polypropylene, polyester, or fiberglass, mat in accordance with ASTM D 5034 or ASTM D 5035. It shall be made specifically for use as a fabric around plant material. Nominal weight shall be a minimum 4 ounces per square yard. Permeability rate shall be a minimum 0.04 inch per second.

2.6 WOOD STAKING MATERIAL

Wood stakes shall be hardwood or fir; rough sawn; free from knots, rot, cross grain, or other defects that would impair their strength.

2.6.1 Bracing Stake

Wood bracing stakes shall be a minimum 2 x 2 inch square and a minimum 8

feet long with a point at one end. Stake shall be set without damaging rootball.

2.6.2 Wood Ground Stakes

Wood ground stakes shall be a minimum of 2 x 2 inch square and a minimum 3 feet long with a point at one end.

2.6.3 Deadmen

Wood deadmen shall be a minimum 4 x 4 x 36 inches long.

2.7 METAL STAKING AND GUYING MATERIAL

Metal shall be aluminum or steel consisting of recycled content made for holding plant material in place.

2.7.1 Bracing Stakes

Metal bracing stakes shall be a minimum 1 inch diameter and a minimum 8 feet long. Stake shall be set without damaging rootball.

2.7.2 Metal Ground Stakes

Metal ground stakes shall be a minimum 1/2 inch diameter and a minimum 3 feet long.

2.7.3 Earth Anchor

Metal earth anchors shall be a minimum 1/2 inch diameter and a minimum 2 feet long.

2.7.4 Guying Material

Metal guying material shall be a minimum 12 gauge wire. Multi-strand cable shall be woven wire. Guying material tensile strength shall conform to the size of tree to be held firmly in place.

2.7.5 Turnbuckle

Metal turnbuckles shall be galvanized or cadmium-plated steel, and shall be a minimum 3 inches long with closed screw eyes on each end. Screw thread tensile strength shall conform to the size of tree to be held firmly in place.

2.8 PLASTIC STAKING AND GUYING MATERIAL

Plastic shall consist of recycled plastic product made for holding plant material firmly in place. Plastic shall not be used for deadmen.

2.8.1 Plastic Bracing Stake

Plastic bracing stakes shall be a minimum 2 inch diameter and a minimum 8 feet long. Stake shall be set without damaging rootball.

2.8.2 Plastic Ground Stakes

Plastic ground stakes shall be a minimum 1 inch diameter and a minimum 3 feet long.

2.8.3 Plastic Guying Material

Plastic guying material shall be designed specifically for the purpose of firmly holding plant material in high wind velocities.

2.8.4 Chafing Guard

Plastic chafing guards shall be used to protect tree trunks and branches when metal is used as guying material. The material shall be the same color throughout the project site. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

2.9 RUBBER GUYING MATERIAL

Rubber chafing guards, consisting of recycled material, shall be used to protect tree trunks and branches when metal guying material is applied. The material shall be the same color throughout the project. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

2.10 FLAG

Plastic flag material shall be used on guying material. It shall be a minimum 6 inches long. Tape color shall be consistent and visually complimentary to the entire project area. The tape color shall meet pedestrian visual safety requirements for day and night.

2.11 TREE ROOT BARRIERS

Tree root barriers shall be metal or plastic consisting of recycled content. Barriers shall utilize vertical stabilizing members to encourage downward tree root growth. Barriers shall limit, by a minimum 90 percent, the occurrence of surface roots. Tree root barriers which are designed to be used as plant pit liners will be rejected.

2.12 MYCORRHIZAL FUNGI INOCULUM

Mycorrhizal fungi inoculum shall be composed of multiple-fungus inoculum as recommended by the manufacturer for the plant material specified.

2.13 WATER

Unless otherwise directed, water shall be the responsibility of the Contractor. Water shall not contain elements toxic to plant life.

2.14 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 EXECUTION

3.1 INSTALLING PLANT MATERIAL TIME AND CONDITIONS

3.1.1 Plant Material Conditions

Planting operations shall be performed only during periods when beneficial

results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted for approval.

3.1.2 Tests

3.1.2.1 Percolation Test

Test for percolation shall be done to determine positive drainage of plant pits and beds. A positive percolation shall consist of a minimum 1 inch per 3 hours; when a negative percolation test occurs, a shop drawing shall be submitted indicating the corrective measures.

3.1.2.2 Soil Test

Delivered topsoil, excavated plant pit soil, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection onsite shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the plant material specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade, Topsoil and Underground Utilities

The Contractor shall verify that finished grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section 02300A EARTHWORK, prior to the commencement of the planting operation. The location of underground utilities and facilities in the area of the planting operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.2.2 Layout

Plant material locations and bed outlines shall be staked on the project site before any excavation is made. Plant material locations may be adjusted to meet field conditions.

3.2.3 Protecting Existing Vegetation

When there are established lawns in the planting area, the turf shall be covered and/or protected during planting operations. Existing trees, shrubs, and plant beds that are to be preserved shall be barricaded along the dripline to protect them during planting operations.

3.3 EXCAVATION

3.3.1 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to plant material location, type of plant and planting method shall be submitted for approval.

3.3.2 Turf Removal

Where the planting operation occurs in an existing lawn area, the turf shall be removed from the excavation area to a depth that will ensure the removal of the entire root system.

3.3.3 Plant Pits

Plant pits for ball and burlapped or container plant material shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits for bare-root plant material shall be dug to a depth equal to the height of the root system. Plant pits shall be dug a minimum 50 percent wider than the ball or root system to allow for root expansion. The pit shall be constructed with sides sloping towards the base as a cone, to encourage well aerated soil to be available to the root system for favorable root growth. Cylindrical pits with vertical sides shall not be used.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient soil has been firmly placed around root system or ball. In relation to the surrounding grade, the plant material shall be set even with the grade at which it was grown.

3.4.1.1 Bare-Root Plant Material

Bare-root plant material shall be placed in water a minimum 30 minutes prior to setting.

3.4.2 Tree Root Barrier

Tree root barriers shall be installed as recommended by the manufacturer. Tree root barriers shall be used for trees located up to a maximum 6 feet from paved surfaces or structures.

3.4.3 Backfill Soil Mixture

The backfill soil mixture may be a mix of topsoil and soil amendments suitable for the plant material specified. When practical, the excavated soil from the plant pit that is not amended provides the best backfill and shall be used.

3.4.4 Adding Mycorrhizal Fungi Inoculum

Mycorrhizal fungi inoculum shall be added as recommended by the manufacturer for the plant material specified.

3.4.5 Backfill Procedure

Prior to backfilling, all metal, wood, synthetic products, or treated burlap devices shall be removed from the ball or root system avoiding damage to the root system. The backfill procedure shall remove air pockets from around the root system. Additional requirements are as follows.

3.4.5.1 Balled and Burlapped, and Balled and Platformed Plant Material

Biodegradable burlap and tying material shall be carefully opened and folded back from the top a minimum 1/3 depth from the top of the root ball. Backfill mixture shall be added to the plant pit in 6 inch layers with each layer tamped.

3.4.5.2 Bare-Root Plant Material

The root system shall be spread out and arranged in its natural position. Damaged roots shall be removed with a clean cut. The backfill soil mixture shall be carefully worked in amongst the roots and watered to form a soupy mixture. Air pockets shall be removed from around the root system, and root to soil contact shall be provided.

3.4.5.3 Container-Grown and Balled and Potted Plant Material

The plant material shall be carefully removed from containers that are not biodegradeable. Prior to setting the plant in the pit, a maximum 1/4 depth of the root mass, measured from the bottom, shall be spread apart to promote new root growth. For plant material in biodegradable containers the container shall be split prior to setting the plant with container. Backfill mixture shall be added to the plant pit in 6 inch layers with each layer tamped.

3.4.5.4 Earth Berm

An earth berm, consisting of backfill soil mixture, shall be formed with a minimum 4 inch height around the edge of the plant pit to aid in water retention and to provide soil for settling adjustments.

3.4.6 Plant Bed

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas. Earth berms shall be provided. Polymers shall be spread uniformly over the plant bed and in the planting pit as recommended by the manufacturer and thoroughly incorporated into the soil to a maximum 4 inch depth.

3.4.7 Watering

Plant pits and plant beds shall be watered immediately after backfilling, until completely saturated.

3.4.8 Staking and Guying

Staking will be required when trees are unstable or will not remain set due to their size, shape, or exposure to high wind velocity.

3.4.8.1 One Bracing Stake

Trees 4 to 6 feet high shall be firmly anchored in place with one bracing stake. The bracing stake shall be placed on the side of the tree facing the prevailing wind. The bracing stake shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly to the stake with a double strand of guying material. The

guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. A chafing guard shall be used when metal is the guying material.

3.4.8.2 Two Bracing Stakes

Trees from 6 to 8 feet height shall be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly between the stakes with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Chafing guards shall be used when metal is the guying material.

3.4.8.3 Three Ground Stakes

Trees over a minimum 8 feet height and less than a maximum 6 inch caliper shall be held firmly in place with 3 bracing or ground stakes spaced equidistantly around the tree. Ground stakes shall be avoided in areas to be mowed. Stakes shall be driven into firm ground outside the earth berm. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. For trees over maximum 3 inch diameter at breast height, turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used when metal is the guying material.

3.4.9 Deadmen or Earth Anchors

Trees over a minimum 6 inch caliper shall be held firmly in place with wood deadmen buried a minimum 3 feet in the ground or metal earth anchors. Multi-strand cable guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used.

3.4.10 Flags

A flag shall be securely fastened to each guy line equidistant between the tree and the stake, deadmen, or earth anchor. The flag shall be visible to pedestrians.

3.5 FINISHING

3.5.1 Plant Material

Prior to placing mulch, the installed area shall be uniformly edged to provide a clear division line between the planted area and the adjacent turf area, shaped as indicated. The installed area shall be raked and smoothed while maintaining the earth berms.

3.5.2 Placing Geotextile

Prior to placing mulch, geotextile shall be placed as indicated in accordance with the manufacturer's recommendations.

3.5.3 Placing Mulch

The placement of mulch shall occur a maximum 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and

prevent weed growth, shall be spread to cover the installed area with a minimum 4 inch uniform thickness. Mulch shall be kept out of the crowns of shrubs, ground cover, and vines and shall be kept off buildings, sidewalks and other facilities.

3.5.4 Pruning

Pruning shall be accomplished by trained and experienced personnel. The pruning of trees and palms shall be in accordance with ANSI A300. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off".

3.6 MAINTENANCE DURING PLANTING OPERATION

Installed plant material shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed to prevent desiccation and shall continue until the plant establishment period commences. Installed areas shall be kept free of weeds, grass, and other undesired vegetation. The maintenance includes maintaining the mulch, watering, and adjusting settling.

3.7 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.7.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.7.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.8 RESTORATION AND CLEAN UP

3.8.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

3.8.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite. Adjacent paved areas shall be cleared.

3.9 PLANT ESTABLISHMENT PERIOD

3.9.1 Commencement

The plant establishment period for maintaining exterior plantings in a healthy growing condition shall commence on the first day of exterior planting work under this contract and shall continue through the remaining life of the contract and end [3] [4] [6] [12] months after the last day of exterior planting required by this contract. Written calendar time period shall be furnished for the plant establishment period. When there is more than one plant establishment period, the boundaries of the planted area covered for each period shall be described. The plant establishment period shall be coordinated with Sections 02921A SEEDING; 02922A SODDING; and 02923A SPRIGGING. The plant establishment period shall be modified for inclement weather shut down periods, or for separate completion dates for areas.

3.9.2 Maintenance During Establishment Period

Maintenance of plant material shall include straightening plant material, straightening stakes; tightening guying material; correcting girdling; supplementing mulch; pruning dead or broken branch tips; maintaining plant material labels; watering; eradicating weeds, insects and disease; post-fertilization; and removing and replacing unhealthy plants.

3.9.2.1 Watering Plant Material

The plant material shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of 1 inch absorbed water per week, delivered in the form of rain or augmented by watering. Run-off, puddling and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or existing plant material shall be prevented.

3.9.2.2 Weeding

Grass and weeds in the installed areas shall not be allowed to reach a maximum 3 inches height before being completely removed, including the root system.

3.9.2.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.2.4 Post-Fertilization

The plant material shall be topdressed at least once during the period of establishment with controlled release fertilizer, reference paragraph SOIL AMENDMENTS. Apply at the rate of 2 pounds per 100 square feet of plant pit or bed area. Dry fertilizer adhering to plants shall be flushed off. The application shall be timed prior to the advent of winter dormancy.

3.9.2.5 Plant Pit Settling

When settling occurs to the backfill soil mixture, additional backfill soil shall be added to the plant pit or plant bed until the backfill level is equal to the surrounding grade. Serious settling that affects the setting of the plant in relation to the maximum depth at which it was grown requires replanting in accordance with paragraph INSTALLATION. The earth berm shall be maintained.

3.9.2.6 Maintenance Record

A record shall be furnished describing the maintenance work performed, the quantity of plant losses, diagnosis of the plant loss, and the quantity of replacements made on each site visit.

3.9.3 Unhealthy Plant Material

A tree shall be considered unhealthy or dead when the main leader has died back, or up to a maximum 25 percent of the crown has died. A shrub shall be considered unhealthy or dead when up to a maximum 25 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine if there is a green cambium layer below the bark. The Contractor shall determine the cause for unhealthy plant material and shall provide recommendations for replacement. Unhealthy or dead plant material shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

3.9.4 Replacement Plant Material

Unless otherwise directed, plant material shall be provided for replacement in accordance with paragraph PLANT MATERIAL. Replacement plant material shall be installed in accordance with paragraph INSTALLATION, and recommendations in paragraph PLANT ESTABLISHMENT PERIOD. Plant material shall be replaced in accordance with paragraph WARRANTY. An extended plant establishment period shall not be required for replacement plant material.

3.9.5 Maintenance Instructions

Written instructions shall be furnished containing drawings and other necessary information for year-round care of the installed plant material; including, when and where maintenance should occur, and the procedures for plant material replacement,.

-- End of Section --

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SECTION 01005

GENERAL AND SPECIAL PROVISIONS

1. SCOPE OF WORK: The work consists of furnishing all labor, equipment, transportation, and materials necessary to perform all work in strict accordance with these specifications, schedules, applicable PWBC Drawings, and other contract documents. The scope of work of this contract includes, but is not limited to, the following specific items of work:

1.1 Civil Work.

1.1.1 Tree Protection

1.1.2 Erosion Control Measures

1.1.3 Clearing and Grubbing

1.1.4 Demolition

1.1.5 Grading

1.1.6 Permanent Erosion Control Measures

1.1.7 Seeding and mulching

2. PROJECT REQUIREMENTS:

2.1 Installation Regulations. The employees of the Contractor will be required to abide by all installation regulations as published by the Commanding Officer. A copy of these regulations can be obtained from the Area/Resident Engineer at the installation. All costs in connection therewith shall be included in the contract price for the work.

2.2 Bulletin Board. Immediately upon beginning of work, the Contractor shall provide a weatherproof, glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the

aforementioned data shall be displayed until work is completed. Upon completion of the work the bulletin board shall be removed by and remain the property of the Contractor.

2.3 Time of Performance. All work shall be performed between 7:30 a.m. and 4 p.m. excluding official holidays, unless otherwise indicated or approved by the Contracting Officer. Requests to work during other than these normal hours shall be made in writing at least 36 hours in advance. For example, a request to work on a Saturday shall be submitted no later than Thursday at noon.

2.4 Certificates of Compliance and Material Submittals. The Contractor shall submit for approval all certificates of compliance and material submittals required in these technical provisions. Required submittals shall be submitted for approval not later than 30 days prior to the approval date needed to achieve compliance with the approved project schedule. Approval must be received from the Contracting Officer or his representative before incorporating the materials into the work. The Contractor shall provide a Submittal Register listing all required submittals in the contract to the COR at the time of the first submittal. Submittal forms (form 59-2-R) and a sample Submittal Register (Form 4288) will be provided at the Prework Conference.

2.5 Safety and Environmental Plans. The Contractor shall submit a proposed safety plan in accordance with the current Corps of Engineers Safety Manual, EM-385-1-1, and shall submit an environmental protection plan in accordance with specifications section 02013, Environmental Protection During Construction, if included in these technical provisions. A sample safety plan form will be provided at the Prework Conference.

2.6 Quality Control. The Contractor shall provide the job superintendent's name and telephone number to the Construction Management Division of the PWBC; building 3-1933, Butner Road; (910) 396-2308, prior to commencement of work. The Contractor shall furnish a daily Contractor Quality Control (CQC)/Superintendent's work report to the Contracting Officer's Representative (COR). A sample CQC report form will be provided at the Prework Conference.

2.7 Excavation Permit. The Contractor shall have a completed and approved PWBC Excavation Permit in his possession prior to any excavation, to include sign or fence-post holes. The Contractor shall schedule an appointment to locate utility lines at least 24 hours prior to any excavation with the PWBC Facilities Maintenance Division, building 3-1634, Butner Road. Utilities are usually located within 5-10 workdays from the date of request but, due to weather conditions, construction workloads, etc., longer periods of time for these utility locates may be experienced. This will be accomplished by submitting a Facilities Maintenance Division Service Order. Service Orders are obtained by calling (910) 396-0321, or making the request on-line at http://www/bragg/army/mil/pwbc/. Service Order status can also be checked on-line at the same web address. A copy of the PWBC Excavation Permit form will be provided at the Prework Conference. The Contractor shall be responsible for coordination with the Information Technology Business Center (ITBC), Outside Plant Branch; building 1-1434, Scott Street; (910)

396-8200, for locating government-owned communication lines prior to any excavation. The Contractor shall also be responsible for coordination with any known or suspected non-governmental utilities such as Sprint telecommunications or cable television. The permit will remain valid for a period of 60 days or as otherwise directed by the issuing authority.

2.8 Disposal and Borrow Permits.

2.8.1 Disposal Permits. A permit is required to use the installation land clearing and inert debris and demolition landfills. Landfill permits shall be processed with the Environmental Compliance Branch of the PWBC Environmental Sustainment Division; building 3-1333, Butner Road; (910) 396-3341, extension 358. Permits are issued for 60 days duration and for the specific contract only. Only materials produced on the project for which the permits are issued may be disposed of in the land clearing and inert debris and demolition landfills. The Contractor shall sort the debris for like materials, such as construction and debris materials, inert debris, etc. All metal products should be brought to the landfill separately and placed in the applicable container. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract disposal operation. Copies of the disposal permit forms will be provided at the Prework Conference. The land clearing and inert debris and demolition debris disposal site locations are shown on the drawings.
Landfills and transfer site are open for customer service from 0730 to 1500 Monday through Friday except Federal holidays. When directed by the Contracting Officer the landfills may be available on an as-required basis for 2 to 6 hours approximately 12 weekends per year (Saturday, Sunday & Holiday).

2.8.2 Borrow Permits. A permit is required to use the Fort Bragg borrow material pits. Borrow pit permits shall be processed with the PWBC Facilities Maintenance Division; Roads and Equipment Branch; Building O-3454, Lamont Road, 396-6873. Permits are issued for the life of the specific contract only. Borrow materials may only be used on the project for which the permits are issued. The Contractor shall keep a copy of the completed permit with the vehicle throughout the contract borrow operation. Copies of the borrow permit forms will be provided at the Prework Conference. The borrow pit location is shown on the drawings.

2.9 Haul Routes. The Contractor is required to use the haul routes shown on the contract drawings for transportation of borrow materials, construction debris, or demolition materials unless otherwise permitted in writing by the COR. When haul routes are not designated in the contract, the Contractor must obtain approval from the COR for the routes he intends to use. The axle load of earth-hauling equipment operating on paved streets shall not exceed 12,000 pounds.

2.10 Utility Outages and Road Closures. Utility, road, and railroad closures require minimum 10 working days advance written notice and will be subject to COR approval. A sample utility outage/road closure request form will be provided at the Prework Conference. Utility outages will be held on normal work days, after hours or on weekend/holidays as coordinated with the Contracting Officer, Ft. Bragg PWBC and the utility provider. The decision on when to have an

outage (normal work hours, weekend, etc) will be based on the length of the outage and the normal business hours/hours of maximum usage for the facilities affected by the outage. Outages will be limited to a duration of 4 hours unless extenuating circumstances dictate otherwise.
In the case of road closures, a sketch shall be provided showing the closure location and all necessary signs and barricades. Necessary signage, barricades, flagpersons, lights (including temporary traffic control lights), and markings for the safe movement of the public during construction shall be in accordance with the Manual on Uniform Traffic Control Devices, and shall be provided at no additional expense to the Government.

2.11 Availability and Use of Utility Services.

2.11.1 Payment for Utility Services
The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to and paid for by the Contractor at the prevailing rates. The rates listed below are current as of January 1, 2003 and are subject to change. The Contractor shall carefully conserve all utilities furnished.

2.11.2 Meters and Temporary Connections
The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections, distribution lines, and meters required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall notify the Contracting Officer’s Representative, in writing, no less than 10 working days before the temporary connection is made. The Contracting Officers Representative will then provide the contractor with the name and phone number of the utility provider. The contractor will be responsible for contacting the utility provider and making arrangements for connections and billing. For temporary electrical connections the Government or applicable utility provider will provide the meter (meter base provided by contractor) and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor shall not make the final electrical connection. For temporary water and sewer connections the contractor will provide the meter and after inspection/approval by the Contracting Officer’s Representative make the final connection at the contractor’s expense.

2.11.3 Use of Permanent Building Utility Connections
Utilities consumed by the contractor from permanent building utility connections shall also be metered and paid for by the contractor. When the permanent system is activated the initial meter reading shall be recorded and reported as specified below. On building renovation projects the initial meter reading shall be recorded when the contractor is given possession of the building to perform the work. The contractor shall pay for utilities consumed through the permanent building connection until the work has been completed or the government has occupied the facility, which ever occurs first.

2.11.4 Initial Meter Readings

Upon installation of the meter, the initial reading shall be recorded (in the presence of the Contracting Officer's Representative) and forwarded to the point of contact for utility service with a copy to the Contracting Officer's Representative.

2.11.5 Final Meter Reading
Before completion of the work and final acceptance of the work by the Government, the Contractor shall notify the Contracting Officer and the applicable utility provider, in writing, 10 working days before termination is desired. The Government or applicable utility provider will take a final meter reading. Electric service will be disconnected by the provider. Water and sewer connections will be disconnected by the contractor, at his expenses and by a method approved by the Contracting Officer's Representative. The Contractor shall then remove all the temporary distribution lines, meters, meter bases, and associated paraphernalia. The Contractor shall pay all outstanding utility bills before final acceptance of the work by the Government.

2.11.6 Requirement for backflow prevention on temporary/permanent potable water connections
The contractor shall install a backflow prevention device on all connections to the potable water system. The backflow prevention device shall be a reduced pressure or double check type, meeting all the State code requirements for backflow preventers on potable water. If the contractor request the use of a fire hydrant and receives approval from the Contracting Officer's Representative a backflow prevention device and meter shall be installed prior to each use.

2.11.7 Utilities Charge Rates
Water ---------- $1.9585 per 1,000 gallons
Electricity ------ $0.0752 per KW hour
Sewer ---------- $10.00/month for each connected trailer up to single wide size.
The rate for larger trailers will be determined by the utility provider, however, this rate will not exceed $20.00/month per trailer.

2.12 <u>As-Built Record Drawings</u>. [Omitted.] [The Contractor shall be responsible for maintaining one set of master prints at the job-site on which he shall keep a careful and neat record of all deviations from the original contract drawings as the work progresses. The Contractor shall note all changes and corrections on these record drawings promptly as the changes occur, but in no case less often than a weekly basis. In addition to incorporated modifications, these record drawings shall also include the actual location of all subsurface utility lines installed or encountered, and the type of materials used.] [Contractor will receive a copy of the contract documents in an electronic format (CD or 3.5 inch diskette) at the time of award, the Contractor shall be responsible for transferring any as-built changes and plan sheet annotations described above onto the electronic format documents.] [The marked-up/annotated prints, or the annotated electronic drawings if applicable, shall be certified as to their correctness by an authorized representative of the Contractor and turned-over to the COR not later than 10 days after acceptance of the work by the Government.]

2.13 Project Sign. The Contractor shall furnish and install a project sign at the location selected by the Contracting Officer. The project sign shall be painted on 1/2 inch thick exterior grade plywood. The sign layout shall be in accordance with the graphic format shown in at the end of this section."

2.14 Color Boards. [Omitted.]

2.15 Construction Debris Leaving Site. All construction debris/trash that leaves the project site will be covered from the time that it leaves the construction site. Any mud or soil which leaves the project site will be cleaned up by the Contractor immediately upon discovery or notification of such an occurrence.

2.16 Protection. Contractor is responsible to provide such covering, shields and barricades as are required to protect building occupants, equipment, stores, supplies, etc., from dust, debris, weather intrusion, water, moisture or other cause of damage resulting from construction.

2.17 Replacement. The Contractor shall be held responsible for the replacement of any utility systems, facilities, or Government equipment damaged during the course of the contract.

2.18 Cleanup. Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

2.19 Sanitation. The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

3. SPECIAL PROVISIONS:

3.1 Occupancy. N/A

3.2 Contractor Vehicle/Equipment Access to Fort Bragg. Fort Bragg is a closed installation, but vehicular access is controlled. Contractors are required to register each vehicle that will be traveling installation roads or streets under its own power. Each such vehicle shall have a registration decal. Registration may be accomplished at the Main Vehicle Registration Center, building 8-1078 on Randolph Street near Bragg Boulevard, 0800-1700 hours Monday through Friday. Unregistered vehicles should expect be stopped and delayed at all access control points. Contractors and all commercially registered vehicles shall use the Knox Street access control point off Bragg Boulevard for all access to Fort Bragg.

3.3 Special Access Requirements.

3.3.1 NC DENR-Land Resources, for inspection of erosion control measures (910-486-1541).

3.3.2 PWBC ENRD Soil Conservationist notification prior to any land disturbing activities after construction limits have been staked and perimeters of trees to be removed are flagged by the Contractor (910-396-7506, ext 136).

3.4 Special Work Constraints. [None]

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SECTION 01330

SUBMITTAL PROCEDURES
01/04

PART 1 GENERAL

1.1 Summary

1.1.1 Government-furnished Information

Submittal register is included at the end of this section. Register will have the following fields completed, to the extent that will be required by th 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) require in each specification section.

Column (e) : Lists one principal paragraph in specification section where 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

1.2 DEFINITIONS

1.2.1 Submittal

Shop drawings, product data, samples, operation and maintenance data, and administrative submittals presented for review and approval. 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

1.2.1.1 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

a. Shop drawings: As used int his section, drawings, schedules, diagrams, and other data prepared specifically for this contract, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work

b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to

illustrate portion of work, but not prepared exclusively for this contract.

c. Samples: Physical examples of products, materials, equiptment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both

d. Operation and Maintenance (O&M) Data: Data that is furnished by the manufacturer, or the system provider, to the equiptment operating and maintenance personnel. This data is needed by operating and maintenance personel for the safe and efficient operation, maintenace and repair of the item. The data is required when the item is delivered to the project site.

e. Administrative Submittals: Data presented for reviews and approval to ensure that the administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.2.2 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 or equipment for some portion of the work.

Samples of warranty language when the contract requires extended

product warranties.

SD-04 Samples

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

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 checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements 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 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.

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-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

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

1.2.3 Approving Authority

Office authorized to approve submittal.

1.2.4 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.

1.3 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

1.4 USE OF SUBMITTAL REGISTER

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.

1.4.1 Submittal Register

Submit submittal register. Submit with quality control plan and project schedule Do not change data in columns (c), (d), (e), (f) as devlivered by the governmet. Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register:

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.

1.4.2 Contractor Use of Submittal Register

Update the following fields.

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.

1.4.3 Approving Authority Use of Submittal Register

Update the following fields.

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to Contractor.

1.4.4 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

1.4.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.5 PROCEDURES FOR SUBMITTALS

1.5.1 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.

1.5.2 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.

1.5.3 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.

1.5.4 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.

1.5.4.1 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).

1.5.4.2 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.

1.5.4.3 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.

1.5.4.4 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.

1.5.5 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.

1.5.6 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 [_____], 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 [_____], 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 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.

1.5.7 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.

1.5.8 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.

1.6 FORMAT OF SUBMITTALS

1.6.1 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.

1.6.2 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.

1.6.3 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.

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

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.

1.6.5 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.

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.6.6 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.

1.6.7 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 pararaph number to which it pertains.

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

a. O&M Data format shall comply with the requirements specified in Section 01781, Operation and Maintenance Data"

1.6.9 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.

1.7 QUANTITY OF SUBMITTALS

1.7.1 Number of Copies of SD-02 Shop Drawings

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

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

Submit in compliance with quantity requirements specified for shop drawings.

1.7.3 SD-04 Number of 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.

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

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

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

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

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

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

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

a. Unless otherwise specified, submit administrative submittals .

1.8 FORWARDING SUBMITTALS

1.8.1 [Enter Appropriate Subpart Title Here]1.9 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.9.1 Government Approved

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.10 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.11 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal.. Any "information only" submittal found to contain errors or unapproved deviations shall be resubmitted as one requiring "approval" action, . If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.12 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations .

1.13 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.14 SUBMITTAL REGISTER

At the end of this section is a submittal register showing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required.

The Contractor is required to complete the submittal register and submit it to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. The submit dates and need dates used in the submittal register shall be coordinated with dates in the Contractor prepared progress schedule. Updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates shall be submitted monthly or until all submittals have been satisfactorily completed. When the progress schedule is revised, the submittal register shall also be revised and both submitted for approval.

1.15 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 14 calendar days

exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

1.16 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.17 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.17.1 Procedures

[_____] The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

1.17.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.18 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.19 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Three copies of the submittal will be retained by the Contracting Officer and two copies of the submittal will be returned to the Contractor.

1.20 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so

prescribe.

1.21 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s).

SIGNATURE: _____

TITLE: _____

DATE: _____

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Erosion Control Street A

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01330	SD-01 Preconstruction Submittals															
			Submittal register	1.3.1	G													
		02220	SD-07 Certificates															
			Demolition plan	1.10	G													
			Notifications	1.4.1	G													
			Notification of Demolition and		G													
			Renovation forms															
			SD-11 Closeout Submittals															
			Receipts															
		02231	SD-03 Product Data															
			Nonsaleable Materials	3.6.2	G													
			SD-04 Samples															
			Tree wound paint	2.1														
			Herbicide	2.2														
		02300	SD-01 Preconstruction Submittals															
			Shoring	3.5	G													
			Dewatering Work Plan		G													
			Blasting		G													
		02370A	SD-02 Shop Drawings															
			Layout	3.2.2														
			Obstructions Below Ground	3.2.4														
			Erosion Control	3.2.2														
			Seed Establishment Period															
			Maintenance Record	3.6														
			SD-03 Product Data															
			Synthetic Grid Systems															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Erosion Control Street A

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02370A	Equipment	1.4														
			Finished Grade	3.1.1														
			Erosion Control Blankets	2.5														
			SD-04 Samples															
			Materials	1.5														
			SD-06 Test Reports															
			Erosion Control Blankets	2.5														
			Sand															
			Gravel															
			SD-07 Certificates															
			Geosynthetic Binders	2.2.2														
			Synthetic Soil Binders	2.2.1														
			Erosion Control Plan	3.1														
			Construction Work Sequence	3.1														
			Schedule															
			Installer's Qualification	1.7														
			Recycled Plastic	2.1														
			Seed															
			Wood By-Products	2.3.6														
			Wood Cellulose Fiber	2.3.3														
			SD-10 Operation and Maintenance															
			Data															
			Maintenance Instructions	3.6.1.1														
		02371A	SD-04 Samples															
			Gabions or Mattresses															
			Alternative Wire Fasteners	2.1.3														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Erosion Control Street A

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		02371A	SD-06 Test Reports															
			Gabions or Mattresses															
			Alternative Wire Fasteners	2.1.3														
			SD-07 Certificates															
			Stone Fill	2.1.5														
			Filter Material	2.1.6														
		02373	SD-03 Product Data															
			Thread	2.1.2														
			Manufacturing Quality Control	2.2														
			Sampling and Testing															
			SD-04 Samples															
			Quality Assurance Samples and	3.1														
			Tests															
			SD-07 Certificates															
			Geotextile	2.1.1														
		02630	SD-03 Product Data															
			Placing Pipe	3.3														
			SD-04 Samples															
			Pipe for Culverts and Storm	2.1														
			Drains															
			SD-07 Certificates															
			Resin Certification	2.1.10														
			Resin Certification	2.1.11														
			Pipeline Testing	3.8														
			Hydrostatic Test on Watertight	2.7														
			Joints															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Erosion Control Street A

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02630	Determination of Density	3.7.5														
			Frame and Cover for Gratings	2.3.7														

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS

03/04

1.1 REFERENCES
1.2 ORDERING INFORMATION

-- End of Section Table of Contents --

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS
03/04

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

AIR-CONDITIONING AND REFRIGERATION INSTITUTE (ARI)
4100 North Fairfax Drive, Suite 200
Arlington, VA 22203
Ph: 703-524-8800
Fax: 703-528-3816
E-mail: ari@ari.org
Internet: http://www.ari.org

AIR CONDITIONING CONTRACTORS OF AMERICA (ACCA)
2800 Shirlington Road, Suite 300
Arlington, VA 22206
Ph: 703-575-4477
Fax: 703-575-4449
E-mail: info@acca.org
Internet: http://www.acca.org

AIR DIFFUSION COUNCIL (ADC)
1000 East Woodfield Road, Suite 102
Shaumburg, IL 60173-5921
Ph: 847-706-6750
Fax: 847-706-6751

E-mail: info@flexibleduct.org
Internet: http://www.flexibleduct.org

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL(AMCA)
30 West University Drive
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088
E-mail: amca@amca.org
Internet: http://www.amca.org

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)
1200 G Street, NW, Suite 500
Washington, D.C. 20005
Ph: 202-628-6380
Fax: 202-393-5453
Internet: http://www.atis.org

ALUMINUM ASSOCIATION (AA)
900 19th Street N.W., Suite 300
Washington, DC 20006
Ph: 202-862-5100
Fax: 202-862-5164
Internet: http://www.aluminum.org

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1827 Walden Office Square
Suite 550
Schaumburg, IL 60173-4268
Ph: 847-303-5664
Fax: 847-303-5774
E-mail: webmaster@aamanet.org
Internet: http://www.aamanet.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 ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)
P.O. Box 12215
Research Triangle Park, NC 27709-2215
Ph: 919-549-8141
Fax: 919-549-8933
E-mail: quantem@aatcc.org
Internet: http://www.aatcc.org

AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA)
2025 M Street, NW, Suite 800
Washington, DC 20036
Ph: 202-367-1155
Fax: 202-367-2155
E-mail: info.abma@smithbucklin.com
Internet: http://www.abma-dc.org

AMERICAN BOILER MANUFACTURERS ASSOCIATION (ABMA)
4001 North 9th Street, Suite 226
Arlington, VA 22203-1900
Ph: 703-522-7350
Fax: 703-522-2665
Internet: http://www.abma.com

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)
222 West Las Colinas Boulevard, Suite 641
Irving, TX 75039-5423
Ph: 972-506-7216
Fax: 972-506-7682
E-mail: info@concrete-pipe.org
Internet: http://www.concrete-pipe.org

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Ph: 513-742-2020
Fax: 513-742-3355
E-mail: mail@acgih.org
Internet: http://www.acgih.org

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)
American Wood Council
ATTN: Publications Department
1111 Nineteenth Street NW, Suite 800
Washington, DC 20036
Ph: 800-890-7732 or 202-463-2766
Fax: 202-463-2791
Internet: http://www.awc.org/

AMERICAN GAS ASSOCIATION (AGA)
400 North Capitol Street N.W.
Washington, D.C. 20001
Ph: 202-824-7000
Fax: 202-824-7115
E-mail: webmaster@aga.org
Internet: http://www.aga.org

AMERICAN GAS ASSOCIATION LABORATORIES (AGAL)
400 North Capitol Street N.W.
Washington, D.C. 20001
Ph: 202-824-7000
Fax: 202-824-7115
Internet: http://www.aga.org

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)
500 Montgomery Street, Suite 300
Alexandria, VA 22314-1560
Ph: 703-684-0211
Fax: 703-684-0242
E-mail: webmaster@agma.org
Internet: http://www.agma.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 INSTITUTE OF STEEL CONSTRUCTION (AISC)
One East Wacker Drive, Suite 3100
Chicago, IL 60601-2001
Ph: 312-670-2400
Fax: 312-670-5403
Publications: 800-644-2400
E-mail: pubs@aisc.org
Internet: http://www.aisc.org

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)
7012 South Revere Parkway, Suite 140
Englewood, CO 80112
Ph: 303-792-9559
Fax: 303-792-0669
E-mail: info@aitc-glulam.org
Internet: http://www.aitc-glulam.org

AMERICAN IRON AND STEEL INSTITUTE (AISI)
1140 Connecticut Avenue, NW, Suite 705
Washington, DC 20036
Ph: 202-452-7100
Fax: 202-463-6573
Internet: http://www.steel.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/

Note --- 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 NURSERY AND LANDSCAPE ASSOCIATION (ANLA)
1000 Vermont Avenue, NW, Suite 300
Washington, DC 20005-4914
Ph: 202-789-2900
Fax: 202-789-1893
Internet: http://www.anla.org

AMERICAN PETROLEUM INSTITUTE (API)
1220 L Street, NW
Washington, DC 20005-4070
Ph: 202-682-8000

Fax: 202-682-8223
Internet: http://www.api.org

AMERICAN PUBLIC HEALTH ASSOCIATION (APHA)
800 I Street, NW
Washington, DC 20001
Ph: 202-777-2742
Fax: 202-777-2534
E-mail: comments@apha.org
Internet: http://www.apha.org

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)
8201 Corporate Drive, Suite 1125
Landover, MD 20785-2230
Ph: 301-459-3200
Fax: 301-459-8077
Internet: http://www.arema.org

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
1711 Arlingate Lane
P.O. Box 28518
Columbus, OH 43228-0518
Ph: 800-222-2768; 614-274-6003
Fax: 614-274-6899
E-mail: webmaster@asnt.org
Internet: http://www.asnt.org

AMERICAN SOCIETY FOR QUALITY (ASQ)
600 North Plankinton Avenue
Milwaukee, WI 53203
Ph: 800-248-1946; 414-272-8575
Fax: 414-272-1734
E-mail: cs@asq.org
Internet: http://www.asq.org

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191-4400
Ph: 703-295-6300 - 800-548-2723
Fax: 703-295-6222
E-mail: marketing@asce.org
Internet: http://www.asce.org

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)
1791 Tullie Circle, NE
Atlanta, GA 30329
Ph: 800-527-4723 or 404-636-8400
Fax: 404-321-5478
E-mail: ashrae@ashrae.org
Internet: http://www.ashrae.org

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
901 Canterbury, Suite A
Westlake, OH 44145
Ph: 440-835-3040
Fax: 440-835-3488
E-mail: info@asse-plumbing.org

Internet: http://www.asse-plumbing.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

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org
Internet: http://www.aws.org

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)
P.O. Box 388
Selma, AL 36702-0388
Ph: 334-874-9800
Fax: 334-874-9008
E-mail: email@awpa.com
Internet: http://www.awpa.com

APA - THE ENGINEERED WOOD ASSOCIATION (APA)
7011 South 19th
Tacoma, WA 98466
Ph: 253-565-6600
Fax: 253-565-7265
E-mail: help@apawood.org
Internet: http://www.apawood.org

ARCHITECTURAL WOODWORK INSTITUTE (AWI)
1952 Isaac Newton Square West
Reston, VA 20190
Ph: 703-733-0600
Fax: 703-733-0584
Internet: http://www.awinet.org

ASBESTOS CEMENT PRODUCT PRODUCERS ASSOCIATION (ACPPA)
PMB114-1745 Jefferson Davis Highway
Arlington, VA 22202
Ph: 514-861-1153
Fax: 514-861-1152
Internet: www.asbestos-institute.ca

ASM INTERNATIONAL (ASM)
9639 Kinsman Road
Materials Park, OH 44073-0002
Ph: 440-338-5151
Fax: 440-338-4634
E-mail: cust-srv@asminternational.org
Internet: http://www.asm-international.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

ASSOCIATED AIR BALANCE COUNCIL (AABC)
1518 K Street, NW
Washington, DC 20005
Ph: 202-737-0202
Fax: 202-638-4833
E-mail: aabchq@aol.com
Internet: http://www.aabchq.com

ASSOCIATION FOR THE ADVANCEMENT OF MEDICAL INSTRUMENTATION (AAMI)
1110 North Glebe Road, Suite 220
Arlington, VA 22201-4795
Ph: 800-332-2264 or 703-525-4890
Fax: 703-276-0793
E-mail: customerservice@aami.org
Internet: http://www.aami.org

ASSOCIATION FOR IRON AND STEEL TECHNOLOGY (AIST)
(FORMERLY: IRON & STEEL SOCIETY (ISS))
186 Thorn Hill Road
Warrendale, PA 15086-7528
Ph: 724-776-6040
Fax: 724-776-1880
E-Mail: info@aistech.org
Internet: http://www.aistech.org

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)
600 North 18th Street
P.O. Box 2641
Birmingham, AL 35291
Ph: 205-257-2530
Fax: 205-257-2540
Internet: http://www.aeic.org

ASSOCIATION OF HOME APPLIANCE MANUFACTURERS (AHAM)
1111 19th Street NW, Suite 402
Washington, DC 20036
Ph: 202-872-5955
Fax: 202-872-9354
E-mail: aham@aham.org
Internet: http://www.aham.org

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SECTION 01451A

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01/03

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SECTION 01451A

CONTRACTOR QUALITY CONTROL
01/03

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 basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 5 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer shall be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified

deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The

Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation shall be promptly furnished to the CQC organization by the Contractor. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, or have a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: civil, materials technician, submittals clerk. These individuals shall be directly employed by the prime Contractor and may not be employed by a supplier or sub-contractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
b.	Submittals	Submittal Clerk with 1 yr experience
c.	Concrete, Pavements and Soils	Materials Technician with 2 yrs experience for the appropriate area

Experience Matrix

Area	Qualifications

3.4.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 15950A HEATING, VENTILATING AND AIR CONDITIONING (HVAC) CONTROL SYSTEMS; 15951A DIRECT DIGITAL CONTROL FOR HVAC; 15990A TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS; or 15995A COMMISSIONING OF HVAC SYSTEMS are included in the contract, the submittals required by those sections shall be coordinated with Section 01330 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the

contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection 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.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final 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 Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. 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 titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 12 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

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. 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 or for excess costs or damages by the Contractor.

-- End of Section --

CEGS-01780 (January 1999)

SECTION 01780

AS-BUILT DRAWINGS SUBMITTALS
01/99

PART 1 GENERAL

1.1 OMITTED

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES.

SD-18 Records

As-Built Drawings; GA.

Drawings showing final as-built conditions of the project. The CADD drawings shall consist of two sets of completed final as-built drawings on separate media. One set of media shall be CADD drawing files. The other set of media shall consist of one set of mylars, two sets of blue line prints of the mylars, and the approved marked working as-built prints.

As-Built Record of Equipment and Materials; GA.

Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.

1.3 PROJECT RECORD DOCUMENTS

1.3.1 As-Built Drawings

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract drawings which are revised to be used for final as-built drawings.

1.3.1.1 Government Furnished Materials

One set of electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file as-built drawings.

1.3.1.2 Working As-Built and Final As-Built Drawings

The Contractor shall revise two sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and available on the job site at all times. Changes from the contract plans which are made in the work or additional information which might be

uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Final as-built drawings shall be prepared after the completion of specific phases of work (foundations, utilities, structural steel, etc., as appropriate for the project). The working as-built marked prints and final as-built drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to incremental submission of each monthly pay estimate. If the Contractor fails to maintain the working and finalas-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. Noncompliance with regard to maintaining as-built drawings will be consideration for an interim unsatisfactory Contractor performance evaluation. The working and final as-built drawings shall show the following information, but not be limited thereto:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

b. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

c. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

d. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

e. Changes or modifications which result from the final inspection.

f. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.

g. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

h. Systems designed or enhanced by the Contractor, such as, HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

i. Modifications change order price shall include the Contractor's cost to change working and final as-built drawings to reflect modifications and comply with the following procedures.

(1) Directions in the modification for posting descriptive changes shall be followed.

(2) A modification circle shall be placed at the location of each deletion.

(3) For all new details or sections which are added to a drawing, a modification circle shall be placed by the detail or section title.

(4) For minor changes, a modification circle shall be placed by the area changed on the drawing (each location).

(5) For major changes to a drawing, place a modification circle by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, a modification circle shall be placed either by the schedule heading or by the change in the schedule.

(7) The modification circle size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.3.1.3 Drawing Preparation

The as-built drawings shall be modified as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, adding such additional drawings as may be necessary. At the time of final inspection, 1 copy of the working as-built prints shall be delivered to the Contracting Officer for review and approval. These working as-built marked prints shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned to the Contracting Officer. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

1.3.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only personnel proficient in the preparation of CADD drawings shall be employed to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings shall be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols shall be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same guidance specified for original drawings. The title block and drawing border to be used for any new final as-built drawings shall be identical to that used on the contract drawings. Additions and corrections to the contract drawings shall be accomplished using CADD files . The Contractor will use the most current version of Microstation software using Windows NT operating system. The electronic files will be supplied on ISO 9660 Format compact discs, read-only memory (CD-ROM). The Contractor shall be responsible for providing all program files and hardware necessary to prepare final as-built drawings. The Contracting Officer will review final as-built drawings for accuracy and the Contractor shall make all required corrections, changes, additions, and deletions.

a. When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high. All other contract drawings shall be marked either "AS-Built" drawing denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions. Original contract drawings shall be dated in the revision block.

b. After receipt by the Contractor of the approved working as-built prints and approval of completed sections of final as-builts the Contractor shall, within 10 days for each specific phase of work for contracts less than $5 million, or 20 days for each specific phase of work for contracts $5 million and above, make the final as-built submittal. This submittal shall consist of one ISO 9660 compact disc, read-only memory (CD-ROM), one set of mylars, and two sets of prints of these drawings and the return of the approved marked working as-built prints. They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this are the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. All paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final as-built drawing files and marked prints as specified shall be cause for withholding any payment due the Contractor under this contract and shall be grounds for a final unsatisfactory Contractor performance evaluation. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.3.1.5 Omitted

1.3.1.6 Payment

No separate payment will be made for as-built drawings required under this contract, and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 02220

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SECTION 02220

DEMOLITION

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	(1996) Safety and Health Requirements Manual

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the [project site]; do not allow accumulations The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible

1.3 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-07 Certificates

Demolition plan; G,

Notifications; G,

[Notification of Demolition and Renovation forms; G,]

Submit proposed [salvage,] demolition and removal procedures [to the Contracting Officer] for approval before work is started.

SD-11 Closeout Submittals

Receipts

Receipts or bills of laden, as specified.

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," safety requirements shall conform with ANSI A10.6.

1.4.1 Notifications

1.4.1.1 General Requirements

Furnish timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61-SUBPART M. Notify theContracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M.

1.4.1.2 [Enter Appropriate Subpart Title Here]

1.4.2 [Enter Appropriate Subpart Title Here]

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debrisand 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 the public

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

1.6.2 Existing Work

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as

a result of any cutting, removal, or demolition work performed under this contract. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement must have Contracting Officer approval.

1.6.3 Trees

Trees within the project site which might be damaged during demolition, and which are indicated to be left in place, shall be protected by a 6 foot high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain that is damaged during the work under this contract shall be replaced in kind or as approved by the Contracting Officer.

1.6.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, of lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.6.5 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

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)

Vehicles are subject to FOD from debris and waste material lying on 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 shall consist of a fence covered with a fabric designed to stop the spread of debris; anchor the fence and fabric to prevent displacement by winds. Remove barricade when no longer required.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by the Contracting Officer.

1.10 REQUIRED DATA

Demolition plan shall include procedures for careful removal and disposition of materials specified to be salvaged, 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. The procedures shall provide for safe conduct of the work in accordance with EM 385-1-1.

1.11 ENVIRONMENTAL PROTECTION

The work shall comply with the requirements of Section [01355A ENVIRONMENTAL PROTECTION DURING CONSTRUCTION.

1.12 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.13 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the approval of the Contracting Officer

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Structures

Existing structures indicated shall be removed as shown. Sidewalks, curbs, and gutters shall be removed as indicated.

3.1.2 Utilities and Related Equipment

Remove existing utilities, as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. If utility lines are encountered that are not shown on drawings, contact the Contracting Officer for further instructions.

3.1.3 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs as indicated. Provide neat sawcuts at limits of pavement removal as indicated.

3.1.4 Concrete

Saw concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

3.1.5 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

a. Holes and depressions caused by previous physical damage or left as a result of removals in existing masonry walls to remain shall be completely filled with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

3.2 [Enter Appropriate Subpart Title Here]3.2.1 Title to Materials

Except where specified in other sections, all materials and equipment removed, and not reused, 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.

3.2.2 Reuse of Materials and Equipment

Remove and store materials and equipment to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.2.3 Salvaged Materials and Equipment

Remove materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site. .

Contractor shall salvage items and material to the maximum extent possible.

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

Salvaged items to remain the property of the Government shall be removed in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents. The following items reserved as property of the Government shall be delivered to the areas designated.

3.3 CLEANUP

Debris and rubbish shall be removed from basement and similar excavations. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

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SECTION 02231

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 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

Nonsaleable Materials; G

Written permission to dispose of such products on private property shall be filed with the Contracting Officer.

SD-04 Samples

Tree wound paint

Herbicide

Submit samples in cans with manufacturer's label.

1.2 DELIVERY, STORAGE, AND HANDLING

Deliver materials to, store at the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

2.1 TREE WOUND PAINT

Bituminous based paint of standard manufacture specially formulated for tree wounds.

2.2 HERBICIDE

[_____]. Comply with Federal Insecticide, Fungicide, and Rodenticide Act (Title 7 U.S.C. Section 136) for requirements on contractor's licensing, certification and record keeping. Contact the command Pest Control Coordinator prior to starting work.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Trees, Shrubs, and Existing Facilities

Protection shall be in accordance with Section 02013 ENVIRONMENTAL PROTECTION DURING CONSTRUCTION Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting Officer in ample time to minimize interruption of the service. Section 02013, ENVIRONMENTAL PROTECTION DURING CONSTRUCTION for additional utility protection.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint. .

3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 PRUNING

Trim trees designated to be left standing within the cleared areas of dead branches 1 1/2 inches or more in diameter; and trim branches to heights and in a manner as indicated. Neatly cut limbs and branches to be trimmed close to the bole of the tree or main branches. Paint cuts more than 1 1/4 inches in diameter with an approved tree wound paint.

3.5 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.6 DISPOSAL OF MATERIALS

3.6.1 Saleable Timber

All timber on the project site noted for clearing and grubbing shall become the property of the Contractor, and shall be removed from the project site and disposed of off stations.

3.6.2 Nonsaleable Materials

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, except for salable timber, shall be disposed of in the designated waste disposal area except when otherwise directed in writing. Such directive will state the conditions covering the disposal of such products and will also state the areas in which they may be placed.

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SECTION 02300

EARTHWORK

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	(2001) 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	(2002) 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	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) 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 698	(2000a) 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,] [CL,] [ML,] [CL-ML,] [CH,] [MH]. Satisfactory materials for grading shall be comprised of stones less than 8 inches, except for fill material for pavements and railroads which shall be comprised of stones less than 2 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 Overhaul

Overhaul is the authorized transportation of satisfactory excavation or borrow materials in excess of the free-haul limit of 100 stations. Overhaul is the product of the quantity of materials hauled beyond the free-haul limit, and the distance such materials are hauled beyond the free-haul limit, expressed in station yards.

1.2.6 Topsoil

Material suitable for topsoils obtained from offsite areas or excavations is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

1.2.7 Hard/Unyielding Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.8 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.

1.2.9 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.2.10 Select Granular Material

1.2.10.1 General Requirements

Select granular material shall consist of materials classified as [GW,] [GP,] [SW,] [SP,] by ASTM D 2487 where indicated. The liquid limit of such material shall not exceed 35 percent when tested in accordance with ASTM D 4318. The plasticity index shall not be greater than 12 percent when tested in accordance with ASTM D 4318, and not more than 35 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D 1140.

1.2.11 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 3inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller..

1.3 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

[Shoring; G

[Dewatering Work Plan; G]

[Blasting; G

Submit 15 days prior to starting work.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

Offsite soils brought in for use as backfill shall be from the Fort Bragg borrow pit.

2.2 MATERIAL FOR RIP-RAP

Provide Bedding material and rock conforming to these requirements for construction indicated.

2.2.1 Bedding Material

Consisting of sand, gravel, or crushed rock, well graded, with a maximum particle size of 2 inches. Material shall be composed of tough, durable particles. Fines passing the No. 200 standard sieve shall have a plasticity index less than six.

2.2.2 Rock

Rock fragments sufficiently durable to ensure permanence in the structure and the environment in which it is to be used. Rock fragments shall be free from cracks, seams, and other defects that would increase the risk of deterioration from natural causes. The size of the fragments shall be such that no individual fragment exceeds a weight of 150 pounds and that no more than 10 percent of the mixture, by weight, consists of fragments weighing 2 pounds or less each. Specific gravity of the rock shall be a minimum of 2.50. The inclusion of more than trace quantities of dirt, sand, clay, and rock fines will not be permitted.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, topsoil shall be stripped to a depth of 4 inches. Topsoil shall be spread on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Any surplus of topsoil from

excavations and grading shall be removed from the site.

3.2 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 the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Excavation of ditches, gutters, and channel changes shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Ditches and gutters shall not be excavated below grades shown. Excessive open ditch or gutter excavation shall be backfilled with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Material excavated shall be disposed of as shown or as directed, except that in no case shall material be deposited less than 4 feet from the edge of a ditch. The Contractor shall maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 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. Where pile foundations are to be used, the excavation of each pit shall be stopped at an elevation 1 foot above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, loose and displaced material shall be removed and excavation completed, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.2.3 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.

3.2.4 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 4 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 4feet high 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.

3.2.4.1 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.

3.2.4.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 6 inches below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.2.4.3 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.

3.2.4.4 Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be [sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members] [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.

3.2.4.5 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.

3.2.5 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.

3.3 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas within the limits of the project site, selected by the Contractor . Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

3.4 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and

measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, borrow pits and other 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. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.5 SHORING

3.5.1 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.

3.6 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 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.

3.7 GROUND SURFACE PREPARATION

3.7.1 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.

3.7.2 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 provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Minimum subgrade density shall be as specified in paragraph TESTING.

3.8 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of in designated waste disposal or spoil areas. 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 in designated areas approved for surplus material storage or designated waste areas as directed. Newly designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. Coarse rock from excavations shall be stockpiled and used for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.9 BURIED TAPE AND DETECTION WIRE

3.9.1 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.

3.9.2 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.

3.10 BACKFILLING AND COMPACTION

Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure. 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, and Section 02630 STORM DRAINAGE; and Section 02300 EARTHWORK. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.10.1 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall be backfilled to 2 feet above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test.

3.10.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.10.1.2 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.

3.10.1.3 Bedding and Initial Backfill

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. Provide materials as follows:

a. Class I: Angular, 0.25 to 1.5 inches, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

b. Class II: Coarse sands and gravels with maximum particle size of 1.5 inches, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

3.10.1.4 Final Backfill

The remainder of the trench, except for special materials for roadways, railroads and airfields, shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

a. Roadways, Railroads, and Airfields: Backfill shall be placed up to the required elevation as specified. Water flooding or jetting methods of compaction will not be permitted.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 12 inch loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.10.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed , 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.

3.11 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.11.1 Gas Distribution

Trenches shall be excavated to a depth that will provide not less than 18 inches of cover in rock excavation and not less than 24 inches of cover in other excavation. Trenches shall be graded as specified for pipe-laying requirements in Section 02556A GAS DISTRIBUTION SYSTEM.

3.11.2 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.

3.11.3 Rip-Rap Construction

Construct rip-rap on filter fabric [with grout] [in accordance with NCDOTin the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.11.3.1 Bedding Placement

Spread bedding material uniformly to a thickness of at least 3 inches on prepared subgrade as indicated. Compaction of bedding is not required. Finish bedding to present even surface free from mounds and windrows.

3.11.3.2 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above. [For grouted rip-rap, hand-place surface rock with open joints to facilitate grouting and do not fill smaller spaces between surface rock with finer material. Provide at least one "weep hole" through grouted rip-rap for every 50 square feet of finished surface. Weep holes shall consist of columns of bedding material, 4 inches in diameter, extending up to the rip-rap surface without grout.]

3.11.3.3 Grouting

[Prior to grouting, wet rip-rap surfaces. Grout rip-rap in successive longitudinal strips, approximately 10 feet in width, commencing at the

lowest strip and working up the slope. Distribute grout to place of final deposit and work into place between stones with brooms, spades, trowels, or vibrating equipment. Take precautions to prevent grout from penetrating bedding layer. Protect and cure surface for a minimum of 7 days.]

3.12 EMBANKMENTS

3.12.1 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 for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. 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.

3.13 SUBGRADE PREPARATION

3.13.1 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.

3.13.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas and railroads, each layer of the embankment shall be compacted to at least 95 percent of laboratory maximum density.

3.14 SHOULDER CONSTRUCTION

Shoulders shall be constructed of satisfactory excavated or borrow material or as otherwise shown or specified. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission of the Contracting Officer has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above, for specific ranges of depth below

the surface of the shoulder. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section shown.

3.15 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. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials. 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.

3.15.1 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.

3.16 PLACING TOPSOIL

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly to a thickness of 4inches and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from [offsite areas] [areas indicated].

3.17 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,ASTM 2167,or ASTM D 2922 . 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.

3.17.1 Fill and Backfill Material Gradation

One test per 10cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with [ASTM C 136] [ASTM D 422] [ASTM D 1140].

3.17.2 In-Place Densities

a. One test per2500 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 1000square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

c. One test per100 linear feet, or fraction thereof, of each lift of embankment or backfill for [roads] [airfields].

d. One test per 100 linear feet, or fraction thereof, of each lift of embankment or backfill for railroads.

3.17.3 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 1000 square feet, or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines.

b. One check test per lift for each 1000 square feet, of fill or backfill areas compacted by hand-operated machines.

c. One check test per lift for each 100linear feet, or fraction thereof, of embankment.

d. One check test per lift for each 100linear feet, or fraction thereof, of embankment or backfill for railroads.

3.17.4 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.

3.17.5 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 100cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.17.6 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.17.7 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to the finished grade surface, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer. Pipe sizes larger than 36 inches shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

3.18 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 wasted in Government disposal area indicated which is located within a haul distance of 2miles OR removed from Government property as directed by the Contracting Officer.

-- End of Section --

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SECTION 02370A

SOIL SURFACE EROSION CONTROL

01/03

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 basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1248	(2002) Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D 1560	(1992; R 2000) Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
ASTM D 1682	(1959T; R 1975) Test for Breaking Load and Elongation of Textile Fabrics
ASTM D 1777	(1996; R 2002) Thickness of Textile Materials
ASTM D 2844	(2001) Resistance R-Value and Expansion Pressure of Compacted Soils
ASTM D 3776	(1996; R 2002) Mass Per Unit Area (Weight) of Fabric
ASTM D 3787	(2001) Bursting Strength of Textiles - Constant-Rate-of-Traverse (CRT), Ball Burst Test
ASTM D 4355	(2002) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1996) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4972	(2001) pH of Soils
ASTM D 5035	(1995; R 2003) Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5268	(2002) Topsoil Used for Landscaping

	Purposes
ASTM D 648	(2001) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

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-02 Shop Drawings

Layout;
Obstructions Below Ground;
Erosion Control;

Scale drawings defining areas to receive recommended materials as required by federal, state or local regulations.

Seed Establishment Period;

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record;

Record of maintenance work performed, of measurements and findings for product failure, recommendations for repair, and products replaced.

SD-03 Product Data

Synthetic Grid Systems; G

Manufacturer's literature including physical characteristics, application and installation instructions.

Equipment;

A listing of equipment to be used for the application of erosion control materials.

Finished Grade;
Erosion Control Blankets; G

Condition of finish grade status prior to installation; location of underground utilities and facilities.

SD-04 Samples

Materials; G

e. Erosion control blankets; 6 inch square.

SD-06 Test Reports

Erosion Control Blankets; G

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

Sand;
Gravel;

Sieve test results. Sand shall be uniformly graded.

SD-07 Certificates

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following.

For items listed in this section:

a. Certification of recycled content or,

b. Statement of recycled content.

c. Certification of origin including the name, address and telephone number of manufacturer.

Geosynthetic Binders;
Synthetic Soil Binders;

Certification for binders showing EPA registered uses, toxicity levels, and application hazards.

Erosion Control Plan;
Construction Work Sequence Schedule;

Erosion control plan. Construction sequence schedule.

Installer's Qualification;

The installer's company name and address; training and experience and or certification.

Recycled Plastic;

Individual component and assembled unit structural integrity test; creep tolerance; deflection tolerance; and vertical load test results. The estimated percentage of recovered material content in the material and components. Life-cycle durability.

Seed;

Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

Composition.

Wood By-Products;

Composition, source, and particle size. Products shall be free from toxic chemicals or hazardous material.

Wood Cellulose Fiber;

Certification stating that wood components were obtained from managed forests.

SD-10 Operation and Maintenance Data

Maintenance Instructions;

Instruction for year-round care of installed material. The Contractor shall include manufacturer supplied spare parts.

1.3 MEASUREMENT AND PAYMENT

1.3.1 Erosion Control Blankets

The erosion control blankets shall be measured by the square yard of surface area covered. No measurement for payment shall be made for fine grading, trenching or other miscellaneous materials necessary for placement of the erosion control blankets.

1.4 DESCRIPTION OF WORK

The work shall consist of furnishing and installing soil surface erosion control materials, including fine grading, blanketing, stapling, mulching and miscellaneous related work, within project limits and in areas outside the project limits where the soil surface is disturbed from work under this contract at the designated locations. This work shall include all necessary materials, labor, supervision and equipment for installation of a complete system. This section shall be coordinated with the requirements of Section 02300 EARTHWORK .

1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

Materials shall be stored in designated areas and as recommended by the manufacturer protected from the elements, direct exposure, and damage. Containers shall not be dropped from trucks. Material shall be free of defects that would void required performance or warranty. Geosynthetic binders and synthetic soil binders shall be delivered in the manufacturer's original sealed containers and stored in a secure area.

a. Erosion control blankets and geotextile fabric shall be furnished in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure prior to placement. Erosion control blanket and geotextile fabric rolls shall be labeled to provide identification sufficient for inventory and quality control purposes.

c. Seed shall be inspected upon arrival at the jobsite for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected.

1.6 SUBSTITUTIONS

Substitutions will not be allowed without written request and approval from the Contracting Officer.

1.7 INSTALLER'S QUALIFICATION

The installer shall be certified by the manufacturer for training and experience installing the material.

1.8 WARRANTY

Erosion control material shall have a warranty for use and durable condition for project specific installations. Temporary erosion control materials shall carry a minimum eighteen month warranty. Permanent erosion control materials shall carry a minimum three year warranty.

PART 2 PRODUCTS

2.1 RECYCLED PLASTIC

Recycled plastic shall contain a minimum 85 percent of recycled post-consumer product. Recycled material shall be constructed or manufactured with a maximum 1/4 inch deflection or creep in any member, according to ASTM D 648 and ASTM D 1248. The components shall be molded of ultraviolet (UV) and color stabilized polyethylene. The material shall consist of a minimum 75 percent plastic profile of high-density polyethylene, low-density polyethylene, and polypropylene raw material. The material shall be non-toxic and have no discernible contaminates such as paper, foil, or wood. The material shall contain a maximum 3 percent air voids and shall be free of splinters, chips, peels, buckling, and cracks. Material shall be resistant to deformation from solar heat gain.

2.2 BINDERS

2.2.1 Synthetic Soil Binders

Calcium chloride, or other standard manufacturer's spray on adhesives designed for dust suppression.

2.2.2 Geosynthetic Binders

Geosynthetic binders shall be manufactured in accordance with ASTM D 1560, ASTM D 2844; and shall be referred to as products manufactured for use as modified emulsions for the purpose of erosion control and soil

stabilization. Emulsions shall be manufactured from all natural materials and provide a hard durable finish.

2.3 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.3.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.3.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.3.3 Wood Cellulose Fiber

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: a minimum 9 to a maximum 15 percent moisture, and between a minimum 4.5 to a maximum 6.0 pH.

2.3.4 Paper Fiber

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.

2.3.5 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.3.6 Wood By-Products

Wood locally chipped or ground bark shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2 inch wide by 4 inch long.

2.3.7 Coir

Coir shall be manufactured from 100 percent coconut fiber cured in fresh water for a minimum of 6 months.

2.3.8 Mulch Control Netting

Mulch control netting may be constructed of lightweight recycled plastic, cotton, or paper or organic fiber. The recycled plastic shall be a woven or nonwoven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from UV, and with the following properties:

a. Minimum grab tensile strength (TF 25 #1/ASTM D 4632), 180 pounds.

b. Minimum Puncture (TF 25 #4/ASTM D 3787), 75 psi in the weakest direction.

c. Apparent opening sieve size of a minimum 40 and maximum 80 (U.S. Sieve Size)..

d. Minimum Trapezoidal tear strength (TF 25 #2/ASTM D 4533), 50 pounds.

2.4 EROSION CONTROL BLANKETS

2.4.1 Erosion Control Blankets Type VII

Erosion control blanket shall be a machine-produced 100 percent biodegradable mat with an herbaceous straw fiber matrix. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top and bottom sides with 100 percent biodegradable woven natural fiber netting. The netting shall consist of machine directional strands formed from two intertwined yarns with cross directional strands interwoven through the twisted machine strands (commonly referred to as a Leno weave) to form an approximate 1/2 by 1/2 inch mesh. The blanket shall be sewn together with biodegradable thread on 1.5 inch centers. The blanket shall have the following properties:

Material Content

Straw	100 percent straw fiber with approximately .5 lb/yd^2 weight.
Netting	Top and bottom sides,Leno woven 100% biodegradable natural organic fiber with approximately 9.3 lb/1,000ft^2 weight.
Thread	Biodegradable

Note: Photodegradable life a minimum of 18 months with a minimum 90 percent light penetration. Apply to slopes up to a maximum 1.5:1 gradient.

2.4.2 Erosion Control Blankets Type IX (Turf Reinforcement Mat)

Permanent erosion control/turf reinforcement mat is constructed of 100 percent coconut fiber stitch bonded between a heavy duty UV stabilized bottom net, and a heavy duty UV stabilized cuspated (crimped) middle netting overlaid with a heavy duty UV stabilized top net. The cuspated netting forms prominent closely spaced ridges across the entire width of the mat. The three nettings are stitched together on 1.5 inch centers with UV stabilized polypropylene thread to form a permanent three dimensional structure. The following list contains further physical properties of the turf erosion control mat.

Property	Test Method	Value	Units
Ground Cover	Image Analysis	93	percent
Thickness	ASTM D 1777		0.63 in
Mass Per Unit Area	ASTM D 3776		0.92 lb/sy
Tensile Strength	ASTM D 5035		480 lb/ft
Elongation	ASTM D 5035		percent
Tensile Strength	ASTM D 5035		960 lb/ft
Elongation	ASTM D 5035	31	percent

Property	Test Method	Value	Units
Tensile Strength	ASTM D 1682		177 lbs
Elongation	ASTM D 1682	22	percent
Resiliency	ASTM D 1777	greater than 80	percent
UV Stability*	ASTM D 4355		151 lbs
		86	percent
Color(permanent net)		UV Black	
Porosity(permanent net)Calculated		greater than 95	percent
Minimum Filament Measured Diameter (permanent net)			0.03 in

NOTE 1: *ASTM D 1682 Tensile Strength and percent Strength Retention of material after 1000 hours of exposure in Xenon-Arc Weatherometer

NOTE 2: Photodegradable life a minimum of 36 months with a minimum 90 percent light penetration. Apply to slopes up to a maximum 1:1 gradient.

2.4.3 Staking

Stakes shall be 100 percent biodegradable manufactured from recycled plastic or wood and shall be designed to safely and effectively secure erosion control blankets for temporary or permanent applications. The biodegradable stake shall be fully degradable by biological activity within a reasonable time frame. The bio-plastic resin used in production of the biodegradable stake shall consist of polylactide, a natural, completely biodegradable substance derived from renewable agricultural resources. The biodegradable stake must exhibit ample rigidity to enable being driven into hard ground, with sufficient flexibility to resist shattering. The biodegradable stake shall have serrations on the leg to increase resistance to pull-out from the soil.

2.4.4 Staples

Staples shall be as recommended by the manufacturer.

2.5 WATER

Unless otherwise directed, water shall be the responsibility of the Contractor. Water shall be potable or supplied by an existing irrigation system.

PART 3 EXECUTION

3.1 CONDITIONS

The Contractor shall submit a construction work sequence schedule, with the approved erosion control plan a minimum of 30 days prior to start of construction. The work schedule shall coordinate the timing of land disturbing activities with the provision of erosion control measures. Erosion control operations shall be performed under favorable weather conditions; when excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped as directed. When special conditions warrant a variance to earthwork operations, a revised construction schedule shall be submitted for approval. Erosion control

materials shall not be applied in adverse weather conditions which could affect their performance.

3.1.1 Finished Grade

The Contractor shall verify that finished grades are as indicated on the drawings; finish grading and compaction shall be completed in accordance with Section 02300 EARTHWORK, prior to the commencement of the work. The location of underground utilities and facilities in the area of the work shall be verified and marked. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.1.2 Placement of Erosion Control Blankets

Before placing the erosion control blankets, ensure the subgrade has been graded smooth; has no depressed, void areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter. Vehicles shall not be permitted directly on the blankets.

3.2 SITE PREPARATION

3.2.1 Soil Test

Soil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size and mechanical analysis. Sample collection onsite shall be random over the entire site. The test shall determine the soil particle size as compatible for the specified material.

3.2.2 Layout

Erosion control material locations may be adjusted to meet field conditions. When soil tests result in unacceptable particle sizes, a shop drawing shall be submitted indicating the corrective measures.

3.2.3 Protecting Existing Vegetation

When there are established lawns in the work area, the turf shall be covered and/or protected or replaced after construction operations. Existing trees, shrubs, and plant beds that are to be preserved shall be barricaded along the dripline. Damage to existing trees shall be mitigated by the Contractor at no additional cost to the Government. Damage shall be assessed by a state certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

3.2.4 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to placement of erosion control material shall be submitted for approval.

3.3 INSTALLATION

3.3.1 Erosion Control Blankets

a. Erosion control blankets shall be installed as indicated and in accordance with manufacturer's recommendations. The extent of erosion control blankets shall be as shown on drawings.

b. Erosion control blankets shall be oriented in vertical strips

and anchored with staples, as indicated. Adjacent strips shall be abutted to allow for installation of a common row of staples. Horizontal joints between erosion control blankets shall be overlapped sufficiently to accommodate a common row of staples with the uphill end on top.

c. Where exposed to overland sheet flow, a trench shall be located at the uphill termination. The erosion control blanket shall be stapled to the bottom of the trench. Backfill and compact the trench as required.

d. Where terminating in a channel containing an installed blanket, the erosion control blanket shall overlap installed blanket sufficiently to accommodate a common row of staples.

3.4 CLEAN-UP

Excess material, debris, and waste materials shall be disposed offsite at an approved landfill or recycling center. Adjacent paved areas shall be cleared. Immediately upon completion of the installation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with Section 10430 EXTERIOR SIGNAGE .

3.5 WATERING SEED

Watering shall be started immediately after installing erosion control blanket type XI (revegetation mat). Water shall be applied to supplement rainfall at a sufficient rate to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.6 MAINTENANCE RECORD

A record shall be furnished describing the maintenance work performed, record of measurements and findings for product failure, recommendations for repair, and products replaced.

3.6.1 Maintenance

Maintenance shall include eradicating weeds; protecting embankments and ditches from surface erosion; maintaining the performance of the erosion control materials and mulch; protecting installed areas from traffic.

3.6.1.1 Maintenance Instructions

Written instructions containing drawings and other necessary information shall be furnished, describing the care of the installed material; including, when and where maintenance should occur, and the procedures for material replacement.

3.6.1.2 Patching and Replacement

Unless otherwise directed, material shall be placed, seamed or patched as recommended by the manufacturer. Material not meeting the required performance as a result of placement, seaming or patching shall be removed from the site. The Contractor shall replace the unacceptable material at no additional cost to the Government.

3.7 SATISFACTORY STAND OF GRASS PLANTS

When erosion control blanket type XI (revegetation mat) is installed, the grass plants shall be evaluated for species and health when the grass plants are a minimum 1 inch high. A satisfactory stand of grass plants from the revegetation mat area shall be a minimum 10 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total revegetation mat area.

-- End of Section --

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09/02

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SECTION 02371A

WIRE MESH GABIONS AND MATTRESSES
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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.

ASTM INTERNATIONAL (ASTM)

ASTM A 313/A 313M	(2003) Stainless Steel Spring Wire
ASTM A 764	(1995; R 2001) Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs
ASTM A 974	(1997; R 2003) Welded Wire Fabric Gabion and Gabion Mattresses (Metallic Coated or Polyvinyl Chloride (PVC) Coated)
ASTM A 975	(1997; R 2003) Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire With Poly(Vinyl Chloride) (PVC) Coating)
ASTM B 117	(2002) Operating Salt Spray (Fog) Apparatus
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 33	(2003) Concrete Aggregates
ASTM D 1242	(1995a) Resistance of Plastic Materials to Abrasion
ASTM D 1499	(1999) Filtered Open-Flame Carbon-Arc Type Exposures of Plastics
ASTM D 2240	(2003) Rubber Property - Durometer Hardness
ASTM D 412	(1998a; R 2002e1) Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 5312	(1992; R 1997) Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
ASTM D 746	(1998e1) Brittleness Temperature of Plastics and Elastomers by Impact

ASTM D 792	(2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM G 152	(2000ae1) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

1.2 DELETED

1.3 GENERAL REQUIREMENTS

The work under this specification includes furnishing, assembling, filling and tying open wire mesh rectangular compartmented gabions and mattresses placed on a prepared surface of geotextile, as specified, and in accordance with the lines, grades, and dimensions shown or otherwise established in the field.

1.4 SUBMITTALS

Government approval is required for submittal with "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-04 Samples

Gabions or Mattresses; G
Alternative Wire Fasteners; G

Samples of the materials, used to fabricate the gabions or mattresses, shall be furnished to the Contracting Officer 60 days prior to assembly of units onsite so that testing may be performed by the Government in accordance with either ASTM A 974 or ASTM A 975 depending on which system is being furnished by the Contractor.

SD-06 Test Reports

Gabions or Mattresses; G
Alternative Wire Fasteners; G

For each shipment of wire gabions or mattresses delivered to the site, the Contractor shall furnish the Contracting Officer, in duplicate, test reports or records that have been performed during the last year on all material contained within the shipment meets the composition, physical, and manufacturing requirements stated in this specification.

SD-07 Certificates

Stone Fill; G
Filter Material; G

A certificate or affidavit signed by a legally authorized official of the supplier of the stone fill and the supplier of the

natural filter material that it meets the quality required and gradation limits specified.

1.5 DESCRIPTION

Gabions and mattresses are wire mesh containers of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stone at the project site to form flexible, permeable, monolithic structures. Gabions and mattresses shall be manufactured with all components mechanically connected at the production facility with the exception of the mattress lid, which is produced separately from the base. The supply to the jobsite of unassembled individual wire mesh components (panels) forming gabions and mattresses will not be permitted. Definitions of terms specific to this specification and to all materials furnished on the jobsite, with the exception of the rock to fill the baskets and the filter material, shall refer and be in compliance with ASTM A 975 for double twisted wire mesh Gabions and Revet mattresses, or with ASTM A 974 for welded wire fabric Gabions and Gabion Mattresses.

1.6 DEFINITIONS

1.6.1 Double twisted wire mesh Gabions and mattresses

They are classified according to the wire coating, which is applied prior to manufacturing the mesh. Coating styles are as follows:

Style 1, consists of wire mesh made from wire which is zinc coated before being double twisted into mesh. Fasteners, lacing wire, and stiffeners are produced from zinc-coated wire;

Style 2, consists of wire mesh made from wire which is coated with Zn-5Al-MM before being double twisted into mesh. Fasteners, lacing wire, and stiffeners are also produced from Zn-5Al-MM coated wire;

Style 3, consists of wire mesh, lacing wire, and stiffeners as Style 1 and overcoated with PVC. Fasteners shall be of stainless steel wire;

Style 4, consists of wire mesh made from wire which is aluminum-coated before being double twisted into mesh. Fasteners, lacing wire, and stiffeners are also produced from aluminum-coated wire.

Style 1 for the wire coating is normally recommended for:

a. permanent gabion or mattress structures, for works installed in non-aggressive or non-polluted environments, and this condition remains unaltered over time;

b. temporary gabion or mattress structures, for works in moderately aggressive environments, depending on the minimum design life of the structure.

Style 2 for the wire coating is normally recommended for:

(1) permanent gabion or mattress structures, for works installed in moderately aggressive environments;

(2) temporary gabion or mattress structures, for works in aggressive environments, depending on the minimum design life of the structure.

Style 3 for the wire coating is normally recommended for both permanent and temporary gabion structures, for works installed in aggressive or polluted environments, or when the aggressiveness of the site is moderately unpredictable or variable from low to high.

Style 4 for the wire coating is very seldom used in the gabion industry. Its life expectancy shall be adequately documented to guarantee its consistency and reliability.

The determination of the rate of aggressiveness (non-aggressive, moderately, or highly aggressive) shall be made on a project-to-project basis, due to the many variables involved and the lack of criteria of general validity. It is normally recommended for the choice to be based on all the available data and on the experience of existing gabion structures in similar environments.

1.7 Government Testing and Studies

1.7.1 Samples

Samples of materials used to fabricate the Gabions or Mattresses shall be furnished to the Contracting Officer 60 days prior to start of installation. Samples will be tested in accordance with specification and either ASTM A 974 or ASTM A 975 depending on which system is being furnished by the Contractor. The Government reserves the right to test additional samples to verify the submitted test records at the Government's expense. When the first test results indicate that the fasteners do not meet the specified requirements, the additional test will be at the Contractor's expense. The fasteners will be rejected after two tests failing to meet the requirements.

1.7.2 Test Report or Documents

Copies of all test results shall be furnished to the Technical Representative of this specification, USACE District, Vicksburg, 4155 Clay St., Vicksburg, MS 39183-3435, Attn: Dale Goss (ED-GI).

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Double twisted wire mesh Gabions and Mattresses

Double twisted wire mesh Gabions and Mattresses shall be , , Style 3, manufactured with a non-raveling mesh made by twisting continuous pairs of wires through three half turns (commonly called double twisted) to form a hexagonal-shaped opening. Gabion and mattress sizes, wire diameters, mesh opening sizes, and tolerances shall comply with the requirements of ASTM A 975 (Tables 1, 3, 4, 5, 6, and Sections 9). Gabions and Matresses shall meet the following test requirements:

PVC for Coating - The PVC coating shall show no cracks or breaks

after the wires are twisted in the fabrication of the mesh. The initial properties of PVC coating material shall have a demonstrated ability to conform to the following requirements:

a. Specific Gravity - In the range from 1.30 to 1.35 dN/dm3, when tested in accordance with test method ASTM D 792;

b. Tensile Strength - Not less than 2985 psi when tested in accordance with test method ASTM D 412;

c. Modulus of Elasticity - Not less than 2700 psi when tested in accordance with test method ASTM D 412;

d. Hardness - Shore "D" between 50 and 60, when tested in accordance with test method ASTM D 2240;

e. Brittleness Temperature - Not higher than 15 degrees F, or lower temperature when specified by the purchaser, when tested in accordance with test method ASTM D 746.

f. Resistance to Abrasion - The percentage of the weight loss shall be less than 12%, when tested in accordance with test method ASTM D 1242;

g. Salt Spray Exposure and Ultra Violet Light Exposure - The PVC shall show no effect after 3,000 h of salt spray exposure in accordance with ASTM B 117. The PVC shall show no effect of exposure to ultra violet light with test exposure of 3,000 h, using apparatus Spectral Irradiance of Open Flame Carbon Arc with Daylight Filters and 145 degrees F, when tested in accordance with practice ASTM D 1499 and ASTM G 152;

h. Evaluation of Coating After Salt Spray and Ultraviolet Exposure Test - After the salt spray test and exposure to ultraviolet light, the PVC coating shall not show cracks nor noticeable change of color, or blisters or splits. In addition, the specific gravity, tensile strength, hardness and resistance to abrasion shall not change more than 6%, 25%, and 10% respectively, from their initial values.

Mesh strength and panel to panel joint strength - The minimum strength requirements of the mesh, selvedge wire to mesh connection, panel to panel connection, and punch test, when tested in accordance with ASTM A 975 Section 13.1, shall be as shown in Table 1. The strength values reported in lb/ft are referred to the unitary width of the specimen. The panel to panel test shall demonstrate the ability of the fastening system to achieve the required strength, and indicate the number of wire revolutions for the lacing wire or the ring spacing for ring fasteners used. The same number of wire revolutions or ring spacing shall be used in the field installation.

TABLE 1

Minimum Strength Requirements of Mesh and Connections

Test description	Gabions, PVC coated lb/ft	Revet mattresses PVC coated lb/ft
Tensile strength parallel to twist	2900	2300
Tensile strength perpendicular to twist	1400	900
Connection to selvedges	1200	700
Panel to panel (using lacing wire or ring fasteners	1200	700

Test description c	Gabions, PVC coated lb	Revet mattresses PVC coated lb
Punch Test	5300	4000

2.1.2 Alternative Wire Fasteners for Gabions and Mattresses

Subject to approval of the Contracting Officer, alternative fastening systems may be used in lieu of lacing wire. Alternative fasteners to lacing wire recommended for woven wire gabions and mattresses, according to ASTM A 975, are steel ring fasteners for metallic coated gabions and mattresses, or stainless steel rings for PVC coated gabions and mattresses. Ring fasteners for woven wire gabions and mattresses shall comply with the minimum requirements indicated in paragaph Ring Fasteners below, and they shall develop a minimum panel to panel joint strength as indicated in TABLE 1. Alternative fasteners to lacing wire for welded wire gabions and mattresses, according to ASTM A 974, are spiral binders. Spiral binders for welded wire gabions and mattresses shall comply with the minimum requirements indicated in paragraph Spiral Binders below. Ring fasteners may alternatively be used for welded wire gabions or mattresses, provided that they comply with the minimum specified requirements (salt spray and pull-apart resistance). Connections panel to panel for welded gabions and mattresses with ring fasteners shall develop a minimum joint strength as indicated in TABLE 3. The Contractor shall provide a complete description of the fastener system and a description of a properly installed fastener, including drawings or photographs if necessary. The Contractor shall provide test results that demonstrate that the alternative-fastening system meets the requirements of the specifications, according to the following criteria:

a. That the proposed fastener system can consistently produce a panel to panel joint strength as indicated in the TABLE 1 for double twisted wire mesh gabions and TABLE 3 for welded wire mesh gabions;

b. That the proposed fastener system does not cause damage to the protective coating on the wire;

c. That the Contractor has the proper equipment and trained employees to correctly install the fasteners;

d. That proper installation can be readily verified by visual inspection.

Samples of wire fasteners with their certified test records shall be submitted at least 60 days in advance to the Contracting Officer for approval. The Government reserves the right to test additional samples to verify the submitted test records at the Government's expense. When the first test results indicate that the fasteners do not meet the specified requirements, the additional test will be at the Contractor's expense. The fasteners will be rejected after two tests failing to meet the requirements.

2.1.2.1 Ring Fasteners

The tensile strength of the zinc-coated steel wire, zinc-5% aluminum coated mischmetal alloy-coated steel wire and aluminum-coated steel wire used for fasteners shall be in accordance with the requirements of ASTM A 764, Type A, B, or C, Table 2 or Table 3. The tensile strength of stainless steel wire used for fasteners shall be in accordance with the requirements of ASTM A 313/A 313M, Type 302, Table 2. Any fastener system shall give the number of fasteners required to comply with TABLE 1, in accordance with ASTM A 975 (Section 13.1.2) for woven wire gabions and mattresses, and TABLE 3, in accordance with ASTM A 974 (Section 7.3), for welded wire gabions and mattresses. Ring fasteners shall not be installed more than 4 inches apart. Each fastener type shall be closed and the free ends of the fastener shall overlap a minimum of 1 inch. The manufacturer or supplier shall state the number of fasteners required for all vertical and horizontal connections for single and multiple basket joining. Approved ring fasteners including fasteners made of stainless steel shall be subject to the salt spray test and pull-apart resistance test and shall be documented by actual testing of panel to panel connections within the last year by validated laboratories.

a. Salt Spray Test - A set of two identical rectangular gabion panels, each with a width about 10-1/2 mesh openings along a selvedge wire, shall be joined by properly installed wire fasteners along the two selvedge wires so that each fastener confines two selvedge and two mesh wires. If the fasteners are also to be used to joint two individual empty gabion baskets, two additional selvedge wires which are each mechanically wrapped with mesh wires shall be included so that each fastener confines four selvedge and four mesh wires. The set of the jointed panels shall be subject to salt spray test, ASTM B 117, for a period of not less than 48 hours. At the end of the test, the fasteners, the selvedge, or mesh wires confined by the fasteners shall show no rusty spots on any part of the surface excluding the cut ends. A properly installed fastener shall meet the following requirements:

1). Each interlocking fastener shall be in a locked and closed position.

2). Each ring fastener shall be closed, and the free ends of the fastener shall overlap a minimum of 1 inch.

b. Pull-Apart Resistance Test - A new set of the jointed panels, which are prepared by the same method as specified in the salt spray test but without being subject to the 48-hour salt spray test, shall be mounted on a loading machine with grips or clamps such that the panels are uniformly secured along the full width. The grips or clamps shall be designed to transmit only tension forces. The load will then be applied at a uniform rate of 50 lbs/sec until failure occurs. The failure is defined as when the maximum

load is reached and a drop of strength is observed with subsequent loading or the opening between any two closest selvedge wires, applicable to a fastener confining either two or four selvedge wires, becomes greater than 2 inches at any place along the panel width. The strength of the jointed panels at failure shall have a minimum as indicated in TABLE 1 or TABLE 3.

2.1.2.2 Spiral Binders

Spiral binders are defined as a length of metallic coated steel wire or metallic coated steel wire with PVC coating preformed into a spiral, used to assemble and interconnect empty gabion and/or mattress units, and to close and secure stone-filled units. Spiral binders shall be fabricated with the same wire and coating style as the wire mesh. Test requirements for spiral binders shall refer to TABLE 3 regarding Metallic Coating, PVC for coating, Tensile Strength, and Panel to Panel Joint Strength.

.2.1.3 Testing

Test records made within one year by certified laboratories and Government agencies will be used to determine the acceptability of the fastening system. Samples of wire fasteners and samples of material for fabricating the gabions and mattresses with their certified test records shall be submitted at least 60 days in advance to the Contracting Officer for approval. The Government reserves the right to test additional samples to verify the submitted test records at the Government's expense. When the first test results indicate that the fasteners do not meet the specified requirements, the additional test will be at the Contractor's expense. The fasteners will be rejected after two tests failing to meet the requirements.

2.1.4 Stone Fill

2.1.4.1 General

For gabions and mattresses, the ability to function properly depends upon their stability, which is partly depending upon the rocks filling them. Rock sizes should be chosen to prevent them from falling through the mesh of the gabions or mattresses. The rock has also to withstand natural weathering processes during the life of the project that would cause it to breakdown to sizes smaller than the wire mesh opening dimensions. Rock to fill gabions and mattresses shall be durable and of suitable quality to ensure permanence in the structure and climate in which it is to be used.

a. Delivery. Rock shall be delivered to the work site in a manner to minimize its reduction in sizes (breakdown) during the handling of the rock, and be placed and secured within the assembled and interconnected gabion or mattress.

b. Sources. The sources from which the Contractor proposes to obtain the material shall be selected well in advance of the time when the material will be required in the work. The inclusion of more than 5% by weight of dirt, sand, clay, and rock fines will not be permitted. Rock may be of a natural deposit of the required sizes, or may be crushed rock produced by any suitable method and by the use of any device that yields the required size limits chosen in TABLE 4.

c. Properties. Rocks shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. .

d. Non-listed Source. The Contractor may, as an option, propose to furnish stone from one non-listed source. The Government may make such investigations and tests as necessary to determine whether acceptable stone can be produced from the proposed source. Suitable samples of stone fill material shall be collected in the presence of a Government representative and submitted to the Contracting Officer for approval prior to delivery of any such material to the work site. Unless otherwise specified, all test samples shall be obtained and delivered at the Contractor's expense to the site at least 60 days in advance of the time when placing of the stone-filled gabions or mattresses is expected to begin. Suitable tests and/or service records will be used to determine the acceptability of the stone. In the event suitable test reports and service records are not available, as in the case of newly operated sources, the material may be subjected to petrography analysis, specific gravity, absorption, wetting and drying, freezing and thawing, and such other tests as may be considered necessary to demonstrate to the satisfaction of the Contracting Officer that the materials are acceptable for use in the work. All tests will be made by or under the supervision of the Government and at its expense.

2.1.4.2 Stone Quality

Stone fill, crushed stone, shall meet the quality requirements of ASTM C 33, and freezing and thawing requirements of ASTM D 5312 for the region of the United States in which the structure will be constructed.

2.1.4.3 Gradation

Gradation of stone for gabions shall be performed every 1000 tons placed under this contract in accordance with ASTM C 136. Sizes of rock to fill gabions and mattresses are chosen on the basis of the mesh sizes, the structure's thickness, and within the limits shown in TABLE 4. Within each range of sizes, the rock shall be large enough to prevent individual pieces from passing through the mesh openings. Each range of sizes may allow for a variation of 5% oversize rock by weight, or 5% undersize rock by weight, or both.

a. Oversize Rock. In all cases, the sizes of any oversize rock shall allow for the placement of three or more layers of rock within each gabion compartment and two or more layers of rock within each mattress compartment dependent upon the height of the mattress.

b. Undersize Rock. In all cases, undersize rock shall be placed within the interior of the gabion or mattress compartment and shall not be placed on the exposed surface of the structure. There shall be a maximum limit of 5% undersize or 5% oversize rock, or both, within each gabion or mattress compartment. The required rock gradation is reported in Table 4.

TABLE 4

Required rock gradation for gabions and mattresses

Type of structure	Thickness (height) inch	Rock sizes inch
	6	3 - 5
	9	3 - 5
Gabions	12	4 - 8
Gabions	18 or higher	4 - 8

2.1.5 Filter Material

The material shall meet the quality requirements of ASTM C 33 for the region in which the structure is located. The gradation test shall be performed in accordance with ASTM C 136. Filter material shall consist of sand and gravel or crushed stone, well graded between the prescribed limits listed below.

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PART 3 EXECUTION

3.1 MATERIAL DELIVERY

Gabions shall be delivered with all components mechanically connected at the production facility . All gabions are supplied in the collapsed form, either folded or bundled or rolled, for shipping. Bundles are banded together at the factory for ease of shipping and handling. .

a. Mattress lids may be supplied either as individual units (bundled) or in roll form. Lacing wire shall be shipped in coils with a diameter of the coil approximately 2 feet. Fasteners shall be shipped in boxes. Preformed stiffeners shall be shipped in bundles.

b. Gabions and mattresses shall be delivered to the jobsite labeled in bundles. Labels shall show the dimensions of the gabions or mattresses included, the number of pieces and the color code.

3.2 FOUNDATION PREPARATION

Foundation preparation shall not take place on frozen or snow-covered ground. After excavation or stripping, to the extent indicated on the drawings or as directed by the Contracting Officer, all remaining loose or otherwise unsuitable materials shall be removed. All depressions shall be carefully backfilled to grade. If pervious materials are encountered in the foundation depressions, the areas shall be backfilled with free-draining materials. Otherwise, the depressions shall be backfilled with suitable materials from adjacent required excavation, or other approved source, and compacted to a density at least equal to that of the adjacent foundation. Any debris that will impede the proper installation and final appearance of the gabion layer shall also be removed, and the voids carefully backfilled and compacted as specified above. Immediately prior to placing the material, the Contracting Officer shall inspect the prepared foundation surface, and no material shall be placed thereon until that area has been approved.

3.3 FILTER PLACEMENT

Filter material shall be spread uniformly on the prepared foundation surface in a manner satisfactory to the Contracting Officer, and to the slopes, lines, and grades as indicated on the drawings or as directed. Placing of filter material by methods, which will tend to segregate particle sizes, will not be permitted. Any damage to the foundation surface during the filter placement shall be repaired before proceeding with the work. Compaction of the filter materials will not be required, but it shall be finished to present a reasonably even surface free from mounds or windrows.

3.4 ASSEMBLY

3.4.1 Double twisted wire mesh Gabions

The gabions shall be opened and unfolded one by one on a flat, hard surface. Gabion units over 6 foot in length usually have an extra shipping fold, which must be removed. The sides, ends and diaphragms shall be lifted up into a vertical position to form an open box shape. The back and the front panels of the gabion shall be connected to the end panels and center diaphragms. The top corner of the end panels and center diaphragms have a selvedge wire extending approximately 4 inches out from the corner edge. The end panels and the diaphragms shall be raised to a vertical position and the selvedge wire shall be wrapped around the edge wire of the top and back panels.

3.4.2 Double Twisted Wire Mesh Revet Mattresses

The mattress shall be laid on a flat, hard surface. When the units are unfolded for assembly, depending on their length, they will have one or two shipping folds, which must be removed. The double flap of the side panel shall be folded in and wired to the diaphragm. At the corners, the end flaps shall be folded along the sides and the joint laced up. Each Revet mattress shall be assembled individually, by erecting the sides, ends and diaphragms, ensuring that all creases are in the correct position and the tops of all sides are level.

3.5 LACING OPERATIONS

3.5.1 Double Twisted Wire Mesh Gabions

Either lacing wire or ring fasteners are permitted to lace double twisted wire mesh Gabions .

a. When using lacing wire, a piece of wire 1.2 to 1.5 times the length of the edge to be laced shall be cut off. If the edge of the basket is 3 foot long, no more than 4 to 5 feet of wire shoul be uses at a time to lace. For vertical joints, starting at the bottom end of the panel, the lacing wire shall be twisted and wrapped two times around the bottom selvedge and double and single loops shall be alternated through at intervals not bigger than 4 to 6 inches. The operation shall be finished by looping around the top selvedge wire. The use of pliers to assemble the units with lacing wire is normally recommended.

b. When steel wire ring fasteners are used, the rings shall be installed at the top and bottom connections of the end and center diaphragms. The ring spacing shall be based on the minimum pull

apart strength as specified in TABLE 1. In any case, the maximum ring spacing along the edges shall not exceed 6 inches. The use of either a mechanical or a pneumatic fastening tool for steel wire ring fasteners is required. Ring fasteners shall be galvanized, stainless steel or Zn-5% aluminum-mischmetal alloy coated.

3.6 INSTALLATION AND FILLING

Empty gabion units shall be assembled individually and placed on the approved surface to the lines and grades as shown or as directed, with the sides, ends, and diaphragms erected in such a manner to ensure the correct position of all creases and that the tops of all sides are level. All gabion units shall be properly staggered as shown in the construction drawings. Finished gabion or mattress structures shall have no gaps along the perimeter of the contact surfaces between adjoining units. All adjoining empty gabion units shall be connected along the perimeter of their contact surfaces in order to obtain a monolithic structure. All lacing wire terminals shall be securely fastened. All joining shall be made through selvedge-to-selvedge or selvedge-to-edge wire connection; mesh-to-mesh or selvedge-to-mesh wire connection is prohibited except in the case where baskets are offset or stacked and selvedge-to-mesh or mesh-to-mesh wire connection would be necessary. As a minimum, a fastener shall be installed at each mesh opening at the location where mesh wire meets selvedge or edge wire.

a. The initial line of basket units shall be placed on the prepared filter layer surface and adjoining empty baskets set to line and grade, and common sides with adjacent units thoroughly laced or fastened. They shall be placed in a manner to remove any kinks from the mesh and to a uniform alignment. The basket units then shall be partially filled to provide anchorage against deformation and displacement during the filling operation. The stone shall be placed in the units as specified in paragraph Stone Fill, subparagraph Gradation, part b.

b. Undue deformation and bulging of the mesh shall be corrected prior to further stone filling. Care shall be taken, when placing the stone by hand or machine, to assure that the PVC coating on gabions will not be damaged. All visible faces shall be filled with some hand placement to ensure a neat and compact appearance and that the void ratio is kept to a minimum.

c. Gabions and mattresses shall be uniformly overfilled by about 1 to 2 inches to compensate for future rock settlements. Gabions and mattresses can be filled by any kind of earth-filling equipment, such as a backhoe, gradall, crane, etc. The maximum height from which the stones may be dropped into the baskets shall be 3 to 4 feet. If PVC coated materials are used, no work shall take place unless the ambient temperature is above 20 degrees F.

3.6.1 Double twisted wire mesh Gabions

After the foundation has been prepared, the pre-assembled gabions shall be placed in their proper location to form the structure. Gabions shall be connected together and aligned before filling the baskets with rock. All connections (panel-to-panel) and basket-to-basket shall be already carried out as described in paragraph ASSEMBLY. Stone fill shall have a gradation of 4 to 8 inches, as described in paragraph Gradation, and shall be placed in 1 foot lifts. Cells shall be filled to a depth not exceeding 1 foot at a time. The fill layer should never be more than 1 foot higher than any

adjoining cell. Stiffeners or internal cross ties shall be installed in all front and side of the gabions at 1/3 and 2/3 of the height for 3 feet or higher gabions, as the cell is being filled. Stiffeners shall be installed in the center of the cells. In 1.5 foot high units, stiffeners or internal crossties are not required. Internal cross ties, or alternatively the preformed stiffeners, shall be looped around three twisted wire mesh openings at each basket face and the wire terminals shall be securely twisted to prevent their loosening. The number of voids shall be minimized by using a well-graded stone in order to achieve a dense, compact stone fill. All corners shall be securely connected to the neighboring baskets of the same layer before filling the units. When more than one layer of gabions is required, in order for the individual units to become incorporated into one continuous structure, the next layer of gabions shall be connected to the layer underneath after this layer has been securely closed. Gabions shall be uniformly overfilled by about 1 to 2 inches to compensate for future rock settlements.

3.6.2 Double Twisted Wire Mesh Revet Mattresses

After being assembled, the Revet mattresses shall be placed in their proper location and securely attached to the adjacent units. For structural integrity, all adjoining empty units shall be connected by means of lacing wire or ring fasteners along the edges of their contact surfaces in order to form a monolithic structure. Revet mattresses shall be placed and securely connected while empty. The filling shall be done unit by unit; however, several units can be pre-assembled prior to filling the units. Revet mattress units shall be filled with hard, durable, clean stone having a gradation as indicated in paragraph Gradation. Care shall be taken to ensure that diaphragm tops are accessible for wiring. On slopes, the Revet mattress shall be laid with the 6 foot dimension (width) longitudinally to the slope and progressing up the slope, except for small ditches or where otherwise specified in the project. When the installation is performed on a slope, the filling of the baskets shall start from the lower side of the bank. Where Revet mattresses are to be placed on steep slopes (3H to 2V), the units shall be secured by hardwood pegs driven into the ground just below the upper end panel, at 6 foot centers, or as specified in the project. When the Revet mattress is to be placed over a geotextile, care shall be taken to ensure that any projecting ends of wire are bent upward to avoid puncturing or tearing the cloth. Lids shall be securely connected to the ends of the mattress and to the top sides and diaphragms using alternate double and single loops, or steel wire ring fasteners, as indicated in paragraph FOUNDATION PREPARATION. In case that more adjacent bases are to be covered at one time, mesh rolls shall be used in place of unit size lids. Revet mattresses shall be uniformly overfilled by about 1 to 2 inches to compensate for future rock settlements.

3.6.3 Non-rectangular Shapes

Gabion and mattress units can conform to bends up to a radius of curvature of 60 to 70 feet without alterations. Units shall be securely connected together first, and be placed to the required curvature, holding them in position by staking the units to the ground with hardwood pegs before filling. For other shapes, bevels and miters can be easily formed by cutting and folding the panels to the required angles.

3.7 CLOSING

Lids shall be tightly secured along all edges, ends and diaphragms in the same manner as described for assembling. Adjacent lids may be securely

attached simultaneously. The panel edges shall be pulled to be connected using the appropriate closing tools where necessary. Single point leverage tools, such as crowbars, may damage the wire mesh and shall not be used. All end wires shall then be turned in.

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SECTION 02373

GEOTEXTILE
09/03

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 4354	(1999) Sampling of Geosynthetics for Testing
ASTM D 4355	(2002) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1996) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4759	(2002) Determining the Specification Conformance of Geosynthetics
ASTM D 4833	(2000e1) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 DELETED

1.3 DELETED

1.4 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

Thread

A minimum of 7 days prior to scheduled use, proposed thread type for sewn seams along with data sheets showing the physical properties of the thread.

Manufacturing Quality Control Sampling and Testing

A minimum of 7 days prior to scheduled use, manufacturer's quality control manual.

SD-04 Samples

Quality Assurance Samples and Tests

Samples for quality assurance testing; 7 days shall be allotted in the schedule to allow for testing.

SD-07 Certificates

Geotextile

A minimum of 7 days prior to scheduled use, manufacturer's certificate of compliance stating that the geotextile meets the requirements of this section. For needle punched geotextiles, the manufacturer shall also certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

Delivery, storage, and handling of geotextile shall be in accordance with ASTM D 4873.

1.5.1 Delivery

The Contracting Officer shall be notified a minimum of 24 hours prior to delivery and unloading of geotextile rolls. Rolls shall be packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, rolls shall be immediately rewrapped with the plastic wrapping. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Each roll shall be labeled with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

1.5.2 Storage

Rolls of geotextile shall be protected from construction equipment,

chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, rolls shall either be elevated off the ground or placed on a sacrificial sheet of plastic in an area where water will not accumulate.

1.5.3 Handling

Geotextile rolls shall be handled and unloaded with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 RAW MATERIALS

2.1.1 Geotextile

Geotextile shall be anonwoven pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material may also be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction. Values for AOS represent maximum average roll values.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	LBS	205	ASTM D 4632
SEAM STRENGTH	LBS		ASTM D 4632
PUNCTURE	LBS	110	ASTM D 4833
TRAPEZOID TEAR	LBS	85	ASTM D 4533
APPARENT OPENING SIZE	U.S. SIEVE	80	ASTM D 4751
PERMITTIVITY	SEC -1	1.5	ASTM D 4491
ULTRAVIOLET DEGRADATION	PERCENT	70 AT 500 HRS	ASTM D 4355

2.1.2 Thread

Sewn seams shall be constructed with high-strength polyester, nylon, or other approved thread type. Thread shall have ultraviolet light stability equivalent to the geotextile and the color shall contrast with the geotextile.

2.2 MANUFACTURING QUALITY CONTROL SAMPLING AND TESTING

The Manufacturer shall be responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request. Manufacturing quality control sampling and testing shall be performed in accordance with the manufacturer's approved quality control manual. As a minimum, geotextiles shall be randomly sampled for testing in accordance with ASTM D 4354, Procedure A. Acceptance of geotextile shall be in accordance with ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

PART 3 EXECUTION

3.1 QUALITY ASSURANCE SAMPLES AND TESTS

3.1.1 Quality Assurance Samples

The Contractor shall provide assistance to the Contracting Officer in the collection of quality assurance samples. Samples shall be collected upon delivery to the site for quality assurance testing at the request of the Contracting Officer. . Samples shall be identified with a waterproof marker by manufacturer's name, product identification, lot number, roll number, and machine direction. The date and a unique sample number shall also be noted on the sample. The outer layer of the geotextile roll shall be discarded prior to sampling a roll. Samples shall then be collected by cutting the full-width of the geotextile sheet a minimum of 3 feet long in the machine direction. Rolls which are sampled shall be immediately resealed in their protective covering.

3.1.2 Quality Assurance Tests

The Contractor shall provide cut sheets stating that the Geotextile meets the specification.

3.2 INSTALLATION

3.2.1 Subgrade Preparation

The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Subgrade materials and compaction requirements shall be in accordance with Section 02231 CLEARING AND GRUBBING, 02300 EARTHWORK, AND 02330A EMBANKMENT FOR EARTH DAMS.

3.2.2 Placement

The Contractor shall notify the Contracting Officer a minimum of 24 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses,

folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, the geotextile shall be laid with the machine direction of the fabric parallel to the slope direction.

3.3 SEAMS

3.3.1 Overlap Seams

Geotextile panels shall be continuously overlapped a minimum of 12 inches at all longitudinal and transverse joints. Where seams must be oriented across the slope, the upper panel shall be lapped over the lower panel. If approved, sewn seams may be used instead of overlapped seams.

3.3.2 Sewn Seams

Factory and field seams shall be continuously sewn on all slopes steeper than 1 vertical on 4 horizontal. The stitch type used shall be a 401 locking chain stitch or as recommended by the manufacturer. For field and factory seams which are sewn, the Contractor shall provide at least a 2-meter sample of sewn seam before the geotextile is installed. For seams that are field sewn, the seams shall be sewn using the same equipment and procedures as will be used for the production seams. If seams are sewn in both the machine and cross machine direction, samples of seams from both directions shall be provided. Quality Assurance seam samples shall be provided to the Government at the request of the Contracting Officer. Seam strength shall meet the minimum requirements specified in Table 1. The thread at the end of each seam run shall be tied off to prevent unraveling. Skipped stitches or discontinuities shall be sewn with an extra line of stitching with a minimum of 18 inches of overlap.

3.4 PROTECTION

The geotextile shall be protected during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Adequate ballast (e.g. sand bags) shall be used to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

3.5 REPAIRS

Torn or damaged geotextile shall be repaired. Clogged areas of geotextile shall be removed. Repairs shall be performed by placing a patch of the same type of geotextile over the damaged area. The patch shall extend a minimum of 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. The machine direction of the patch shall be aligned with the machine direction of the geotextile being repaired. Geotextile rolls which cannot be repaired shall be removed and replaced. Repairs shall be performed at no additional cost to the Government

3.6 PENETRATIONS

Engineered penetrations of the geotextile shall be constructed by methods recommended by the geotextile manufacturer.

3.7 COVERING

Geotextile shall not be covered prior to inspection and approval by the Contracting Officer. Cover soil shall be placed in a manner that prevents

soil from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves. On side slopes, soil backfill shall be placed from the bottom of the slope upward. Cover soil shall not be dropped onto the geotextile from a height greater than 3 feet. No equipment shall be operated directly on top of the geotextile without approval of the Contracting Officer. Equipment with ground pressures less than 7 psi shall be used to place the first lift over the geotextile. A minimum of 12 inches of soil shall be maintained between full-scale construction equipment and the geotextile. Cover soil material type, compaction, and testing requirements are described in Section 02300 EARTHWORK, AND 02330A EMBANKMENT FOR EARTH DAMS. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph.

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SECTION 02630

STORM DRAINAGE
07/03

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 in the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-17	(2002) Standard Specifications for Highway Bridges
AASHTO M 190	(1995; R 2000) Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 198	(2003) Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
AASHTO M 243	(1996; R 2000) Field-Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 294	(2003) Corrugated Polyethylene Pipe, 300- to 1200-mm Diameter
AASHTO MP 7	(2001) Specification for Corrugated Polyethylene Pipe, 1350 and 1500 mm Diameter

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(2003) Manual for Railway Engineering

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 48/A 48M	(2000) Gray Iron Castings
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM A 798/A 798M	(2001) Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

ASTM A 807/A 807M	(2002e1) Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
ASTM A 929/A 929M	(2001) Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM B 26/B 26M	(2003) Aluminum-Alloy Sand Castings
ASTM C 12	(2003) Installing Vitrified Clay Pipe Lines
ASTM C 139	(2003) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 270	(2003) Mortar for Unit Masonry
ASTM C 32	(1993; R 1999e1) Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 425	(2002) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(2002) Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 478	(2003) Precast Reinforced Concrete Manhole Sections
ASTM C 55	(2003) Concrete Brick
ASTM C 62	(2001) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 76	(2003) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 789	(2000) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM C 877	(2002) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
ASTM C 923	(2002) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM D 1056	(2000) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1171	(1999) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified

	Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1784	(2003) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2321	(2000) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3034	(2000) 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 3350	(2002a) Polyethylene Plastics Pipe and Fittings Materials
ASTM F 477	(2002e1) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 679	(2003) Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F 714	(2003) Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTM F 794	(2003) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 894	(1998a) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 949	(2003) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

1.2 DELETED

1.3 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

Placing Pipe

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-04 Samples

Pipe for Culverts and Storm Drains

Samples not required.

SD-07 Certificates

Resin Certification
Pipeline Testing
Hydrostatic Test on Watertight Joints
Determination of Density
Frame and Cover for Gratings

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.4.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

ASTM C 76, Class IV V.

2.1.2 PVC Pipe

The pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, shall be submitted prior to installation of the pipe.

2.1.2.1 Type PSM PVC Pipe

ASTM D 3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.2.2 Profile PVC Pipe

ASTM F 794, Series 46, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.2.3 Smooth Wall PVC Pipe

ASTM F 679 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.2.4 Corrugated PVC Pipe

ASTM F 949 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.3 PE Pipe

The pipe manufacturer's resin certification indicating the cell classification of PE used to manufacture the pipe shall be submitted prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D 3350.

2.1.3.1 Smooth Wall PE Pipe

ASTM F 714, maximum DR of 21 for pipes 3 to 24 inches in diameter and maximum DR of 26 for pipes 26 to 48 inches in diameter. Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335434C.

2.1.3.2 Corrugated PE Pipe

AASHTO M 294, Type S or D, for pipes 12 to 48 inches and AASHTO MP 7, Type S or D, for pipes 54 to 60 inches produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class in accordance with AASHTO M 294. Pipe walls shall have the following properties:

Nominal Size (in.)	Minimum Wall Area (square in/ft)	Minimum Moment of Inertia of Wall Section (in to the 4th/in)
12	1.50	0.024
15	1.91	0.053
18	2.34	0.062
24	3.14	0.116
30	3.92	0.163
36	4.50	0.222
42	4.69	0.543
48	5.15	0.543
54	5.67	0.800
60	6.45	0.800

2.1.3.3 Profile Wall PE Pipe

ASTM F 894, RSC 160, produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 334433C. Pipe walls shall have the following properties:

		Minimum Moment Of Inertia of Wall Section (in to the 4th/in)	
Nominal Size (in.)	Minimum Wall Area (square in/ft)	Cell Class 334433C	Cell Class 335434C
18	2.96	0.052	0.038
21	4.15	0.070	0.051
24	4.66	0.081	0.059
27	5.91	0.125	0.091
30	5.91	0.125	0.091
33	6.99	0.161	0.132
36	8.08	0.202	0.165
42	7.81	0.277	0.227
48	8.82	0.338	0.277

2.2 DRAINAGE STRUCTURES

2.2.1 Flared End Sections

Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A 929/A 929M.

2.2.2 Precast Reinforced Concrete Box

Boxes subjected to highway loadings shall conform to ASTM C 789.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4000 psi concrete under Section 03300A CAST-IN-PLACE STRUCTURAL CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be 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 have a thickness of at least 3 inches between steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 5 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.3 Precast Concrete Segmental Blocks

Precast concrete segmental block shall conform to ASTM C 139, not more than 8 inches thick, not less than 8 inches long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

2.3.4 Brick

Brick shall conform to ASTM C 62, Grade SW; ASTM C 55, Grade S-I or S-II; or ASTM C 32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 1/2 inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

2.3.5 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478. Joints between precast concrete risers and tops shall be made with flexible

watertight, rubber-type gaskets meeting the requirements of paragraph JOINTS.

2.3.6 Prefabricated Corrugated Metal Manholes

Manholes shall be of the type and design recommended by the manufacturer. Manholes shall be complete with frames and cover, or frames and gratings.

2.3.7 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48/A 48M, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

2.3.8 Joints

2.3.8.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.

b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.3.8.2 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877.

2.3.8.3 Flexible Watertight, Gasketed Joints

a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 7 inches wide and approximately 3/8 inch thick, meeting the requirements of ASTM D 1056, Type 2 , and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 13/16 inch in diameter for pipe diameters of 36 inches or smaller and 7/8 inch in diameter for larger pipe having 1/2 inch deep end corrugation. Rubber O-ring gaskets shall be 1-3/8 inches in diameter for pipe having 1 inch deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C 443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

b. Connecting Bands: Connecting bands shall be of the type, size and

sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

2.3.8.4 PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.3.8.5 Smooth Wall PE Plastic Pipe

Pipe shall be joined using butt fusion method as recommended by the pipe manufacturer.

2.3.8.6 Corrugated PE Plastic Pipe

Water tight joints shall be made using a PVC or PE coupling and rubber gaskets as recommended by the pipe manufacturer. Rubber gaskets shall conform to ASTM F 477. Soil tight joints shall conform to the requirements in AASHTO HB-17, Division II, Section 26.4.2.4. (e) for soil tightness and shall be as recommended by the pipe manufacturer.

2.3.8.7 Profile Wall PE Plastic Pipe

Joints shall be gasketed or thermal weld type with integral bell in accordance with ASTM F 894.

2.3.8.8 Ductile Iron Pipe

Couplings and fittings shall be as recommended by the pipe manufacturer.

2.4 STEEL LADDER

Steel ladder shall be provided where the depth of the manhole exceeds 12 feet. These ladders shall 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 2-1/2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M.

2.5 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A 48/A 48M, Class 30B or 35B. Shape and size shall be as indicated.

2.6 RESILIENT CONNECTORS

Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C 923.

2.7 HYDROSTATIC TEST ON WATERTIGHT JOINTS

2.7.1 Concrete, Clay, PVC and PE Pipe

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443. Test requirements for joints in clay pipe shall conform to ASTM C 425. Test requirements for joints in PVC and PE plastic pipe shall conform to ASTM D 3212.

2.7.2 Corrugated Steel and Aluminum Pipe

A hydrostatic test shall be made on the watertight joint system or coupling band type proposed. The moment strength required of the joint is expressed as 15 percent of the calculated moment capacity of the pipe on a transverse section remote from the joint by the AASHTO HB-17 (Division II, Section 26). The pipe shall be supported for the hydrostatic test with the joint located at the point which develops 15 percent of the moment capacity of the pipe based on the allowable span in feet for the pipe flowing full or 40,000 foot-pounds, whichever is less. Performance requirements shall be met at an internal hydrostatic pressure of 10 psi for a 10 minute period for both annular corrugated metal pipe and helical corrugated metal pipe with factory reformed ends.

2.8 EROSION CONTROL RIPRAP

Provide nonerodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of as indicated.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 02300 EARTHWORK and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 18 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between

unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 02300 EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.2.2 Clay Pipe Requirements

Bedding for clay pipe shall be as specified by ASTM C 12.

3.2.3 Corrugated Metal Pipe

Bedding for corrugated metal pipe and pipe arch shall be in accordance with ASTM A 798/A 798M. It is not required to shape the bedding to the pipe geometry. However, for pipe arches, the Contractor shall either shape the bedding to the relatively flat bottom arc or fine grade the foundation to a shallow v-shape. Bedding for corrugated structural plate pipe shall meet requirements of ASTM A 807/A 807M.

3.2.4 Ductile Iron and Cast-Iron Pipe

Bedding for ductile iron and cast-iron pipe shall be as shown on the drawings.

3.2.5 Plastic Pipe

Bedding for PVC and PE pipe shall meet the requirements of ASTM D 2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Corrugated Steel and Aluminum Alloy	5
Concrete-Lined Corrugated Steel	3
Ductile Iron Culvert	3
Plastic	7.5

Not less than 30 days after the completion of backfilling, the Government may perform a deflection test on the entire length of installed flexible pipe using a mandrel or other suitable device. Installed flexible pipe showing deflections greater than those indicated above shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced.

3.3.1 Concrete, Clay, PVC, Ribbed PVC, Ductile Iron and Cast-Iron Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.3.2 Elliptical and Elliptical Reinforced Concrete Pipe

The manufacturer's reference lines, designating the top of the pipe, shall be within 5 degrees of a vertical plane through the longitudinal axis of the pipe, during placement. Damage to or misalignment of the pipe shall be prevented in all backfilling operations.

3.3.3 Corrugated PE Pipe

Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's recommendations.

3.3.4 Corrugated Metal Pipe and Pipe Arch

Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides. Part paved pipe shall be installed so that the centerline of bituminous pavement in the pipe, indicated by suitable markings on the top at each end of the pipe sections, coincides with the

specified alignment of pipe. Fully paved steel pipe or pipe arch shall have a painted or otherwise applied label inside the pipe or pipe arch indicating sheet thickness of pipe or pipe arch. Any unprotected metal in the joints shall be coated with bituminous material as specified in AASHTO M 190 or AASHTO M 243. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs shall be used to facilitate moving pipe without damage to exterior or interior coatings. During transportation and installation, pipe or pipe arch and coupling bands shall be handled with care to preclude damage to the coating, paving or lining. Damaged coatings, pavings and linings shall be repaired in accordance with the manufacturer's recommendations prior to placing backfill. Pipe on which coating, paving or lining has been damaged to such an extent that satisfactory field repairs cannot be made shall be removed and replaced. Vertical elongation, where indicated, shall be accomplished by factory elongation. Suitable markings or properly placed lifting lugs shall be provided to ensure placement of factory elongated pipe in a vertical plane.

3.3.5 Structural-Plate Steel

Structural plate shall be installed in accordance with ASTM A 807/A 807M. Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all bolts are tightened to meet the torque requirements of 200 foot-pounds plus or minus 50 foot-pounds. Any power wrenches used shall be checked by the use of hand torque wrenches or long-handled socket or structural wrenches for amount of torque produced. Power wrenches shall be checked and adjusted frequently as needed, according to type or condition, to ensure proper adjustment to supply the required torque.

3.3.6 Structural-Plate Aluminum

Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all bolts are torqued to a minimum of 100 foot-pounds on aluminum alloy bolts and a minimum of 150 foot-pounds on galvanized steel bolts. Any power wrenches used shall be checked by the use of hand torque wrenches or long-handled socket or structural wrenches for the amount of torque produced. Power wrenches shall be checked and adjusted as frequently as needed, according to type or condition, to ensure that they are in proper adjustment to supply the required torque.

3.3.7 Multiple Culverts

Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 3 feet apart, whichever is less.

3.3.8 Jacking Pipe Through Fills

Methods of operation and installation for jacking pipe through fills shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Manual.

3.4 JOINTING

3.4.1 Concrete and Clay Pipe

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 8 inches apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from the high

side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.1.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

3.4.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 1/2 inch, thick and the width of the diaper band shall be at least 8 inches. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.

3.4.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.7 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.4.1.8 External Sealing Band Joint for Noncircular Pipe

Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.4.2 Corrugated Metal Pipe

3.4.2.1 Field Joints

Transverse field joints shall be designed so that the successive connection of pipe sections will form a continuous line free of appreciable irregularities in the flow line. In addition, the joints shall meet the general performance requirements described in ASTM A 798/A 798M. Suitable transverse field joints which satisfy the requirements for one or more of the joint performance categories can be obtained with the following types of connecting bands furnished with suitable band-end fastening devices: corrugated bands, bands with projections, flat bands, and bands of special design that engage factory reformed ends of corrugated pipe. The space between the pipe and connecting bands shall be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, shall be tapped with a soft-head mallet of wood, rubber or plastic, to take up slack and ensure a tight joint. Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of fill material during the life of the installations. The type, size, and sheet thickness of the band and the size of angles or lugs and bolts shall be as indicated or where not indicated, shall be as specified in the applicable standards or specifications for the pipe.

3.4.2.2 Flexible Watertight, Gasketed Joints

Installation shall be as recommended by the gasket manufacturer for use of lubricants and cements and other special installation requirements. The gasket shall be placed over one end of a section of pipe for half the width of the gasket. The other half shall be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket shall then be rolled over the adjoining section. Any unevenness in overlap shall be corrected so that the gasket covers the end of pipe sections equally. Connecting bands shall be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened. Band Tightening: The band shall be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket shall seat properly in the corrugations. Watertight joints shall remain

uncovered for a period of time designated, and before being covered, tightness of the nuts shall be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut shall be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete, precast concrete segmental blocks, prefabricated corrugated metal, or bituminous coated corrugated metal; complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to

commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 12 inches.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall

be determined in accordance with ASTM D 2167,ASTM D 1556 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. 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 be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. 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.

3.8 PIPELINE TESTING

3.8.1 Leakage Tests

Lines shall not be tested for leakage

3.8.2 Deflection Testing

Perform a deflection test on entire length of installed plastic pipeline on completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection measuring device.

a. Pull-through device: This device shall be a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section. Pull-through device may also be of a design promulgated by the Uni-Bell Plastic Pipe Association, provided that the device meets the applicable requirements specified in this paragraph, including those for diameter of the device. Ball, cylinder, or circular sections shall conform to the following:

   (1) A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.

   (2) A homogeneous material throughout, with a density greater than 1.0 as related to water at 39.2 degrees F, and a surface Brinell hardness of not less than 150.

   (3) Center bored and through bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of not less than 70,000 psi, with eyes or loops at each end for attaching pulling cables.

   (4) Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.

b. Deflection measuring device: Sensitive to 1.0 percent of the

diameter of the pipe being tested and accurate to 1.0 percent of the indicated dimension. Deflection measuring device shall be approved by the Contracting Officer prior to use.

c. Pull-through device: Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions as specified.

d. Deflection measuring device procedure: Measure deflections through each run of installed pipe. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, remove pipe which has excessive deflection, replace with new pipe, and completely retest in same manner and under same conditions.

e. Warranty period test: Pipe found to have a deflection of greater than 5 percent of average inside diameter when deflection test is performed just prior to end of one-year warranty period shall be replaced with new pipe and tested as specified for leakage and deflection.

3.9 FIELD PAINTING

After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

-- End of Section --

SECTION 02921B

EROSION CONTROL AND TURF SEEDING

DESCRIPTION OF WORK: This work shall consist of complete ground preparation and establishment of a permanent cover of grass on all open earth areas and all disturbed areas within the limits of construction. The work shall conform to this specification and shall be carefully coordinated with the site grading operations and erosion control work shown on the drawings and/or as covered in the specifications.

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.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS Seed Act	(1995) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 977	(1998) Emulsified Asphalt

STATE OF NORTH CAROLINA

North Carolina Seed Law
North Carolina Commercial Fertilizer Law
North Carolina Liming Materials and Landplaster Act
North Carolina Department of Transportation Standard Specifications for Roads and Structures, 1984 or Later Edition

1.2 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-07 Certificates

Seed; GA

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

SD-11 Closeout Submittals

Records and Test Data, Quality Control; FIO

1.3 OMITTED.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Omitted.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.3 Omitted.

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments shall be rejected. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants.

1.4.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with the AMS Seed Act and applicable state seed laws.

2.1.2 Permanent Seed Species, Mixtures and Rates of Application

Erosion Control Mix, March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Paspalum notatum	Pensacola Bahiagrass	50
Cynodon dactylon	Common Bermudagrass (hulled)	10
Lespedeza striata	Kobe Lespedeza	35
Setaria italica	German Millet	25

Erosion Control Mix, September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Paspalum notatum	Pensacola Bahiagrass	50
Cynodon dactylon	Common Bermudagrass (hulled)	5
Cynodon dactylon	Common Bermudagrass (unhulled)	5
Lespedeza striata	Kobe Lespedeza	35
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	25

Turf Mix, March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Cynodon dactylon	Common Bermudagrass (unhulled is acceptable, but not required)	100
Setaria italica	German Millet	25

Turf Mix, September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Cynodon dactylon	Common Bermudagrass (hulled)	50
Cynodon dactylon	Common Bermudagrass (unhulled)	50
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	25

2.1.3 Temporary Seed Species

Temporary seed species and rates for surface erosion control or turfed areas shall be as follows.

March 1 through August 31 - Summer

Botanical Name	Common Name	Rate (lb/acre)
Setaria italica	German Millet	50

September 1 through February 28 - Winter

Botanical Name	Common Name	Rate (lb/acre)
Secale cereale (Abruzzi)	Rye Grain NO RYE GRASS!!!	50

2.1.4 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.1.5 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 OMITTED.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of lime and fertilizer meeting the following requirements.

2.3.1 Lime

Lime shall be agricultural grade, dolomitic limestone meeting requirements of the North Carolina Liming Materials and Landplaster Act and of ASTM C 602.

2.3.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and shall conform to applicable state regulations. Granular fertilizer shall conform to the North Carolina Commercial Fertilizer Law and shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 10 percent nitrogen, 20 percent phosphoric acid, and 20 percent potash. When slow release nitrogen forms are used in the fertilizer mixture, they shall be derived from sulfur-coated urea, urea formaldehyde, plastic or polymer-coated prills, or isobutylene diurea. Upon approval by the Contracting Officer, a different analysis of fertilizer may be used, provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.4.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.4.3 Wood Cellulose Fiber

Wood cellulose fiber mulch shall be used only in hydroseeding applications. It shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.4.4 Paper Fiber

Paper fiber mulch shall be used only in hydroseeding applications. It shall be recycled news print that is shredded for the purpose of mulching seed.

2.5 ASPHALT ADHESIVE

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1; or to North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures, grade CRS-1 or CRS-1H.

2.6 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

2.7 OMITTED.

2.8 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.8.1 Surface Erosion Control Straw or Excelsior Blanket

2.8.1.1 Straw Net Blanket

Straw blanket material manufactured for erosion control purposes. It shall be produced of 100% agriculture straw. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

2.8.1.2 Excelsior Blanket

Blanket shall be machine produced mat of wood excelsior formed from a web of interlocking wood fibers; covered on one side with either knitted straw blanket-like mat construction; covered with biodegradable plastic mesh; or interwoven biodegradable thread, plastic netting, or twisted kraft paper cord netting.

2.8.2 Surface Erosion Control Coconut Fiber Blanket

Coconut fiber erosion control blanket material manufactured for erosion control purposes. It shall be produced of 100% coconut fiber. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

2.8.3 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from March 1 through August 31 for summer establishment; and from September 1 through February 28 for winter establishment, in accordance with paragraph SEED.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.2 SITE PREPARATION

3.2.1 Finished Grade

The Contractor shall verify that finished grades are as indicated on drawings, and that smooth grading and compaction requirements have been completed prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying Lime

The application rate shall be 2000 pounds per acre. Lime shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The application rate shall be 400 pounds per acre. Fertilizer shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation. An additional 400 pounds per acre shall be applied after acceptance of permanent grass in accordance with paragraph POST-FERTILIZATION.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Existing dirt trails and open areas which are to be planted with pines shall be tilled for the top 12 inches. Lime and fertilizer may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Turf Area Debris

Debris and stones over a minimum 5/8 inch in any dimension shall be removed from the surface.

3.2.4.3 Erosion Control Area Debris

Debris and stones over a minimum 3 inches in any dimension shall be removed from the surface.

3.2.4.4 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be Broadcast Seeding, Drill Seeding, or Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be

used because of the difficulty in achieving even coverage, unless otherwise approved. If used, absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate shown in paragraph SEED, using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 1/4 inch depth by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.1.2 Drill Seeding

Seed shall be uniformly drilled to a maximum 1/2 inch depth and at the rate shown in paragraph SEED, using equipment having drills a maximum 7 inches distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

3.3.1.3 Rolling

The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rates shown in paragraph SEED. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified, or fertilizer may be applied separately in accordance with paragraph SITE PREPARATION. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Half of the wood cellulose or paper fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. The remaining half of the mulch and tackifier shall be mixed and applied in a second application. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

3.3.3 Mulching

3.3.3.1 Hay or Straw Mulch

Straw mulch shall be spread uniformly at the rate of 2 tons per acre. Hay mulch shall be spread uniformly at the rate of 3 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.3.3.3 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be sprayed at a rate between 10 to 13 gallons per 1000 square feet. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber or recycled paper fiber shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3.4 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

3.4.2 Temporary Seeding

Bare or disturbed areas that will be left over 15 days, or areas where directed during contract delays affecting the seeding operation, shall be seeded in accordance with temporary seed species and rates listed under paragraph SEED.

3.5 OMITTED

3.6 OMITTED

3.7 RESTORATION AND CLEAN UP

3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.7.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.9 SEED ESTABLISHMENT PERIOD

3.9.1 Quality Control

During construction, an established system of quality control shall be maintained. To assure compliance with contract requirements and the maintenance of records of all materials, equipment, and construction operations, quality control shall include but not be limited to the following:

Seeding -- Specified species planted at proper rates; preparation of planting bed as to thoroughness of tillage, leveling and depth of planting.

Mulching -- Types and rates of application.

Satisfactory stand of grass -- Coverage of the planted species at the end of the specified growth period, and the maintenance procedures, including supplemental fertilization.

A copy of all records and test data required herein, and the records of corrective action taken, shall be furnished the Contracting Officer.

3.9.2 Satisfactory Stand of Grass Plants, Turf or Erosion Control Area

A stand of turf is considered acceptable when the new growing sprouts of permanent grass are visible at the surface showing not less than 20 seedlings of permanent grass at least 2 inches long in each square foot, where no gaps larger than 4 inches in diameter occur anywhere in the seeded area, and where the total bare spots do not exceed 2 percent of the total seeded area. Permanent grass is defined as Common Bermuda or Pensacola Bahia.

3.9.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.9.3.1 Mowing

a. Turf Areas: Turf areas shall be mowed to a minimum 3 inch height when the turf is a maximum 4 inches high. Clippings shall be

removed when the amount cut prevents sunlight from reaching the ground surface.

b. Erosion Control Areas: Erosion control areas shall be mowed to a minimum 4 inch height when the plants are a maximum 8 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.9.3.2 Post-Fertilization

After the permanent grass has been accepted, and between the dates of April 15 and October 15, apply 400 pounds of fertilizer per acre.

3.9.3.3 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.3.4 Warranty

There is no 1 year warranty for maintenance after acceptance of grass.

Section No.: 02921B/S
Dated: June 2001
Notice/Date:

SUBMITTAL REGISTER DATA

Spec & Paragraph Number	Description of Submittal	Type of Submittal* 1	2	3	4	5	6	7	8	9	Classification FIO	GA
02921B 2.1	Seed							X				D
02921B, 3.9.1	Records and Test Data (Quality Control)									X	X	

*1 = Data 3 = Instructions 5 = Statements 7 = Certificates 9 = Records
2 = Drawings 4 = Schedules 6 = Report 8 = Samples