

US Army Corps
of Engineers
Baltimore District

CONSTRUCTION SPECIFICATIONS

DALECARLIA PUMPING STATION VALVE AND PIPING IMPROVEMENTS

WASHINGTON AQUEDUCT, WASHINGTON, D.C.

INVITATION NO. **W912DR-04-B-0003**

CONTRACT NO.

DATE **NOV 28, 2003**

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SECTION 01000

ADMINISTRATIVE REQUIREMENTS

01/01

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-01 Preconstruction Submittals

Title Evidence

Proof of purchase for equipment and/or materials.

Invoice Copies

Proof of rental equipment costs.

Photographs

Photographs and, as applicable, negatives showing construction progress.

SD-03 Product Data

Cost or Pricing Data

Proof of actual equipment costs.

Equipment Data

An itemized list of serial/model numbers and equipment installed by the Contractor under this contract.

SD-10 Operation and Maintenance Data

O and M Data

A list of proposed maintenance and instruction manuals that is mainly used for but not limited to customized equipment.

1.2 PROGRESS SCHEDULING AND REPORTING (DEC 1998)

1.2.1 Practicable Progress Schedule

The Contractor shall, within 20 days after date of commencement of work or as otherwise determined by the Contracting Officer, submit for approval a practicable progress schedule in accordance with specification Section 01320 PROJECT SCHEDULE showing the manner in which he intends to prosecute the work.

1.2.2 Software Package

The Contractor shall utilize an industry recognized RMS-W compatible scheduling software package to implement the requirements of Section 01320 PROJECT SCHEDULE. The program and data must be IBM PC compatible in a Window environment. These requirements are not intended to restrict the Contractors selection of an automated scheduling system but to establish a format which will allow use of the same program with government computers and automated information systems. The Contractor will provide at least one program installation and maintenance on government hardware complete with all program and data files. Such installation shall be maintained for the duration of the project until fiscal completion and shall allow analysis and of the project schedule by government personnel or agents.

1.2.3 Additional Scheduling Requirements

The Contractor shall incorporate the following requirements in addition to those specified in Section 01320 PROJECT SCHEDULE.

1.2.4 Preparation of Operation and Maintenance (O&M) Manuals

The Contractor shall provide a separate activity for the preparation and submission of all O&M manuals. The associated cost of \$3000 shall be assessed for this activity.

1.2.5 Additional Commissioning Requirements

Provide separate activities for commissioning of systems shown below. Each activity shall be as a minimum duration as shown below and shall have an appropriate associated cost.

- a. Communication System 30 days in Duration \$3,000 Cost

1.3 PAYMENTS TO CONTRACTORS: (NOV 1976)

For payment purposes only, an allowance will be made by the Contracting Officer of 100 percent of the invoiced cost of materials or equipment delivered to the site but not incorporated into the construction, pursuant to the Contract Clause entitled "PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS". The Contracting Officer may also, at his discretion, take into consideration the cost of materials or equipment stored at locations other than the jobsite, when making progress payments under the contract. In order to be eligible for payment, the Contractor must provide satisfactory evidence that he has acquired title to such material or equipment, and that it will be utilized on the work covered by this contract. Further, all items must be properly stored and protected. Earnings will be computed using 100% of invoiced value. (CENAB-CO-E)

1.4 IDENTIFICATION OF EMPLOYEES: (OCT 1983)

Each employee assigned to this project by the Contractor and subcontractors shall be required to display at all times, while on the project site, an approved form of identification provided by the Contractor, as an authorized employee of the Contractor/subcontractor. In addition, on those projects where identification is prescribed and furnished by the Government, it shall be displayed as required and it shall immediately be returned to the Contracting Officer for cancellation upon release of the assigned employee and or completion of project. (CENAB)

1.5 PURCHASE ORDER: (SEP 1975)

One readable copy of all purchase orders or other title evidence for material and equipment, showing firm names and addresses, and all shipping bills, or memoranda of shipment received regarding such material and equipment, shall be furnished the appointed Contracting Officer's Representative as soon as issued. Such orders, shipping bills or memoranda shall be so worded or marked that all material and each item, piece or member of equipment can be definitely identified on the drawings. Where a priority rating is assigned to a contract, this rating, the required delivery date, and the scheduled shipping date shall also be shown on the purchase order. At the option of the Contractor, the copy of the purchase order may or may not indicate the purchase price. (CENAB-CO-E)

1.6 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (EFARS 52.0231.5000 (OCT 1995))

(a) This clause does not apply to terminations. See 52.249-5000, Basis for settlement of proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable conditions owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual costs data for each piece of equipment or groups of similar serial and services for which the government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs can not be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP1110-1-8 Construction Equipment Ownership and Operating Expenses Schedule, Region East. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d) (ii) and Far 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established proactive of leasing the same or similar equipment to unaffiliated leases. Provide equipment invoice copies.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet. CENAB-CT/SEP 95 (EFARS 52.231-5000)

1.7 REAL PROPERTY EQUIPMENT DATA: (APR 1975)

At or before the time of completion of the contract, the Contractor shall

submit to the Contracting Officer a complete itemized list, including serial and model number where applicable, showing the unit retail value of each Contractor furnished item of mechanical, electrical and plumbing equipment installed by the Contractor under this contract. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier, against defective materials, design, and workmanship, the following information shall be given: the name, address and telephone number of the Subcontractor, Equipment Supplier, or Manufacturer originating the guaranteed item. The list shall be accompanied by a copy of the specific guarantee document for each item which is specified herein to be guaranteed if one had been furnished to the Contractor by the Equipment Supplier or Manufacturer. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Baltimore District NADB Form 1019 may be utilized for the itemized listing and will be made available to the Contractor upon request. (CENAB-CO-E)

1.8 O and M DATA: (JUL 1979)

The requirements for furnishing operation and maintenance data and field instruction are specified elsewhere in the specifications. The Contractor shall submit to the Contracting Officer, at a time prior to the 50% project completion time, a list of proposed maintenance and instruction manuals to be furnished the Government and the scheduled dates of all required field instructions to be provided by Contractor furnished personnel or manufacturer's representatives. All maintenance and instruction manuals must be furnished to the Contracting Officer at least 2 weeks prior to the scheduled dates of any required Contractor furnished field instructions or at least one month prior to project completion if no Contractor furnished field instructions are required. (CENAB)

1.9 NEGOTIATED MODIFICATIONS: (OCT 84)

Whenever profit is negotiated as an element of price for any modification to this contract with either prime or subcontractor, a reasonable profit shall be negotiated or determined by using the OCE Weighted Guidelines method outlined in EFARS 15.902. (Sugg. NAB 84-232)

1.10 FACILITY SECURITY CLEARANCE REQUIREMENT

The Washington Aqueduct has been designated a Critical Infrastructure Facility under the National Critical Infrastructure Program which was outlined in Presidential Decision Directive 63. All Contractor and sub-contractor personnel must consent to a review of public records and screening of personal background information before access is granted to Washington Aqueduct facilities. Failure to provide requested information may result in denial of access to facilities. No information will be released to outside agencies. The following major types of adverse information may exclude a contractor from gaining access to restricted areas or general unescorted access to Washington Aqueduct property. Each case will be reviewed on its own merit:

1. Illegal use or abuse of drugs or alcohol, theft or dishonesty, unreliability, instability, use of force, violence and weapons related incidents that indicate a general disregard for the law.
2. Aberrant, deviant sexual behavior or bizarre sexual conduct. Contributing to the delinquency or minors, child molestation, and/or

rape. Records or testimony of employment, education or military service where the individual was involved in serious offenses or incidents that would reflect adversely on the honesty, integrity, trustworthiness, or stability of the individual.

3. Excessive indebtedness, bad checks, financial difficulties or irresponsibility.

4. Failing or refusing to sign the proper authorization documents to conduct the background screenings.

5. Knowingly providing false information on Official Government Documents.

1.11 HOT-WORK PERMIT

A hot-work permit, DA Form 5383-R (copy attached to the end of this section), must be submitted to the Facility Safety Officer before using heat-producing equipment. Additional instructions are found on attached "NAME OF INSTALLATION Fire Department Pre-Construction Conference Report" form, which also includes a requirement to attend a briefing conference and provide a signature acknowledging receipt of briefing.

1.12 PHOTOGRAPHS

PHOTOGRAPHIC COVERAGE: (SEP 85) The Contractor shall provide photographic coverage under the contract. These services shall be for ten commercial grade color photographs every three months from the beginning of the contract until acceptance of the completed work. These photographs shall be in 8" x 10" size and shall be taken at intervals and at the place designated by the Contracting Officer. Negatives from all of the above photographs shall be given to and become the property of the Government. (CENAB-CO)

1.13 PARTNERING: (NOV 92)

In order to most effectively accomplish this contract, the Government is willing to form a cohesive partnership with the Contractor and its subcontractors. This partnership would strive to draw on the strengths of each organization in an effort to achieve a quality project done right the first time, within budget and on schedule. This partnership would be bilateral in make-up and participation will be totally voluntary. Any cost associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. (CENAB-EN-DT)

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

NOT APPLICABLE

-- End of Section --

HOT WORK PERMIT

1. LOCATION	2. DATE	3. PERMIT NO.
4. TYPE OF WORK	5. START TIME	6. FINISH TIME
7.a. NAME OF PERSON RESPONSIBLE FOR HOT-WORK AT JOB SITE	7.b. SIGNATURE	

PRECAUTIONS BEFORE OPERATIONS

CHECKLIST	CHECK ONE	
	YES	NO
8. Fire extinguisher present specific to the hazard and inspected prior to use?		
9. Forced air ventilation?		
10. Fire Watch required?		
11. Confined Space Permit certification?		
12. Lock Out/Tag Out procedures?		
13. Emergency communications available?		
14. Removal/protection of combustibles/flammables? <i>(If yes, note in remarks)</i>		
15. Personnel protective equipment available and used? <i>(Welding shield/goggles, gloves, hearing protection, safety shoes, respiratory protection)</i>		
16. Fire Blanket		
17. Welding screen required?		
18. Area barricades required and in place?		
19. Are other precautions required? <i>(If yes, note in remarks)</i>		
20. AREA FIRE CAPTAIN'S SIGNATURE	21. DATE/TIME	

PRECAUTIONS AFTER OPERATIONS

CHECKLIST	CHECK ONE	
	YES	NO
1. Are after work conditions safe?		
2. Are heat producing devices safe if left at site?		
3. Area Fire Chief notified?		
4. AREA FIRE CAPTAIN'S SIGNATURE	5. DATE/TIME	

REMARKS

NOTE: PERMIT VALID ON DAY OF OPERATION AT ONE LOCATION ONLY

SECTION 01050

JOB CONDITIONS
01/01

PART 1 GENERAL

1.1 LAYOUT OF WORK

LAYOUT OF WORK: (APR 1972) The Contractor shall lay out his work and shall be responsible for all measurements in connection therewith. The Contractor shall furnish, at his own expense, all templates, platforms, equipment, tools and materials and labor as may be required in laying out any part of the work. The Contractor will be held responsible for the execution of the work to such lines and elevations shown on the drawings or indicated by the Contracting Officer. (CENAB)

1.2 PHYSICAL DATA: (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation or conclusion drawn from the data or information by the Contractor. (CENAB)

1.2.1 Transportation Facilities

WASHINGTON AQUEDUCT DIVISION (WA), WASHINGTON, D.C.

The principal access route to the Washington Aqueduct is MacArthur Boulevard. Public bus service is provided by the Washington Metropolitan Area Transit Service.

1.2.2 Explorations

The physical conditions indicated on the drawings and in the specifications are the result of site investigations by visual inspection.

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-01 Preconstruction Submittals

Shut Down Utility Services; G WA

Prior approval for service/utility interruptions.

Checklist; G WA

A Risk Assessment for excavation and other work in the vicinity of utilities.

1.4 UTILITIES

1.4.1 Availability of Utilities Including Lavatory Facilities: (JUN 1980)

It shall be the responsibility of the Contractor to provide all utilities he may require during the entire life of the contract. He shall make his own investigation and determinations as to the availability and adequacy of utilities for his use for construction purposes and domestic consumption. He shall install and maintain all necessary supply lines, connections, piping, and meters if required, but only at such locations and in such manner as approved by the Contracting Officer. Before final acceptance of work under this contract, all temporary supply lines, connections and piping installed by the Contractor shall be removed by him in a manner satisfactory to the Contracting Officer. (CENAB)

1.4.2 Interruption of Utilities: (1972)

a. No utility services shall be interrupted by the Contractor to make connections, to relocate, or for any purpose without approval of the Contracting Officer.

b. Request for permission to shut down utility services shall be submitted in writing to the Contracting Officer not less than 17 days prior to proposed date of interruption. The request shall give the following information:

1. Nature of Utility (Gas, L.P. or H.P., Water, Etc.)
2. Size of line and location of shutoff.
3. Buildings and services affected.
4. Hours and date of shutoff.
5. Estimated length of time service will be interrupted.

c. Services will not be shut off until receipt of approval of the proposed hours and date from the Contracting Officer.

d. Shutoffs which will cause interruption of Government work operations as determined by the Contracting Officer shall be accomplished during regular non-work hours or on non-work days of the Using Agency without any additional cost to the Government.

e. Operation of valves on water mains will be by Government personnel. Where shutoff of water lines interrupts service to fire hydrants or fire sprinkler systems, the Contractor shall arrange his operations and have sufficient material and personnel available to complete the work without undue delay or to restore service without delay in event of emergency.

f. Flow in gas mains which have been shut off shall not be restored until the Government inspector has determined that all items serviced by the gas line have been shut off. (CENAB)

g. Specifications related to interruptions to the pumping station operations are presented in Section 01520.

1.4.3 Utility Markings

The Contractor shall contact the Contracting Officer and the One-Call Service, a minimum of 14 days and 48 hours, respectively, prior to any excavation, requesting utility location markings. The Contractor shall not proceed with any excavation until all utilities, including abandoned utilities, have been marked to the satisfaction of the Contracting Officer.

Prior to requesting the marking of utilities, the Contractor shall stake out proposed excavations and limits of work with white lines ("White Lining"). It is the Contractor's responsibility to ensure that all permits (excavation or otherwise, including DPW permits) are current and up-to-date without expiration. In addition to the above requirements the Contractor shall:

- a) Visually survey and verify that all utility markings are consistent with existing appurtenances such as manholes, valve boxes, poles, pedestals, pad-mounted devices, gas meters, etc. prior to any excavation.
- b) Hand dig test holes to verify the depth and location of all utilities prior to any mechanical excavation within the limits of work. Other non-damaging methods for utility verification, as indicated in (d) below, may be considered subject to approval by the Contracting Officer. Also, verify that any abandoned utilities are not active.
- c) Preserve all utility markings for the duration of the project to the furthest extent possible.
- d) When excavation is performed within 2 feet of any utility line, a non-damaging method of excavation shall be used. The non-damaging method shall be hand digging. Other non-damaging methods, such as, soft digging, vacuum excavation, pneumatic hand tools, may be considered subject to approval by the Contracting Officer.
- e) Regardless of the type of excavation, the Contractor shall notify the Contracting Officer a minimum of 72 hours prior to any excavation activity. Failure to notify the Contracting Officer can result in the issuance of a "Stop Work" order, which shall not be justification for contract delay or time extension. The Government reserves the right to have personnel present on site during any type of excavation.
- f) The Contractor's Quality Control System Manager shall ensure that all excavation requirements herein are met at the time of the preparatory phase of quality control, and that the excavation procedures are reviewed during the preparatory phase meeting. This preparatory phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.
- g) Any work other than excavation in the vicinity of a utility, that could damage or interrupt a utility, such as, exterior or interior work near transformers, power lines, poles, above ground gas lines, gas meters, etc., shall be done with extreme care. The Contractor shall specifically note during the preparatory phase of quality control, the construction techniques to be used to

preclude damaging or interrupting any utility. This preparatory phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.

- h) The Contractor shall complete a risk assessment, using the attached checklist, at least one week prior to the start of any excavation or other work in the vicinity of a utility. The risk assessment shall be submitted for government approval prior to any excavation or other work in the vicinity of a utility. A risk assessment shall be completed for each definable feature of work encountering utilities and shall include all utilities anticipated to be encountered.

1.5 DISPOSAL OF EXISTING MATERIAL AND EQUIPMENT: (DEC 1975)

All removed, dismantled or demolished material and/or equipment including rubble, scrap and debris not specified or indicated to be Government salvaged, reinstalled under this contract or otherwise retained for disposal on Government land will become the property of the Contractor and shall be promptly removed from the site and disposed of by the Contractor at his own expense and responsibility. (CENAB)

1.6 COMPLIANCE WITH REGULATIONS: (JUL 1980)

All rules and regulations issued by the Chief of Washington Aqueduct covering general safety, security, sanitary requirements, pollution control, traffic regulations and parking, shall be observed by the Contractor. Information regarding these requirements may be obtained by contacting the Contracting Officer, who will provide such information or assist in obtaining same from appropriate authorities. (MEMO)

1.7 MAINTENANCE OF ACCESS: (DEC 1975)

The Contractor shall not block passage through sidewalks, roads, alleys or other entranceways to the building during performance of work under this contract. In addition, the Contractor shall at all times maintain safe and clear passage through interior corridors and doorways to allow minimal disruption of normal activities within the building. No equipment or new materials are to be stored in the building except those items that are necessary for progress of the immediate work. All existing equipment, materials and debris removed during the work that are not to be reinstalled shall be removed daily by the Contractor from the building. (CENAB)

1.8 PROTECTION OF GOVERNMENT PROPERTY AND PERSONNEL: (DEC 1975)

1.8.1 Protection of Equipment

All existing Government owned equipment within the work area shall be protected by the Contractor from damage caused by construction operations. As a minimum, the Contractor shall cover all furniture, equipment and carpets in the work area with dust barriers and protect such items from any damage due to dust, vibration, water, heat or other conditions resulting from construction activities. Existing work damaged by construction operations shall be promptly repaired by the Contractor at his own expense.

1.8.2 Protection of Personnel

The Contractor shall protect occupants of the building by installing safety rails and/or barricades as applicable to prevent injury from unauthorized entry of personnel into work areas. Warning signs shall be erected as necessary to indicate Construction areas or hazardous zones. Work shall proceed in such manner as to prevent the undue spread of dust and flying particles.

1.8.3 Measures to Prevent Damage/Injury

The Contractor shall take such additional measures as may be directed by the Contracting Officer to prevent damage or injury to Government property or personnel. (CENAB)

1.9 STREET CLOSINGS: (MAY 1978)

When operations in connection with contract work necessitate the closing of streets, it shall be the Contractor's responsibility to arrange in advance with the Contracting Officer for such street closings and to provide appropriate barricades, signs, markers, flares, and other devices as may be required by the Contracting Officer's Representative for traffic guides and public safety. (CENAB)

1.10 MAINTENANCE OF UTILITIES: (FEB 1985)

Throughout construction, the Contractor shall provide and/or maintain toilet facilities for Government personnel. The Contractor shall provide alternate space heating for Government personnel when necessary during shutdown of the heating system. (CENAB)

1.11 SALVAGE MATERIALS AND EQUIPMENT: (OCT 1993)

The Contractor shall maintain adequate property control records for all materials and equipment specified to be salvaged. These records may be in accordance with the Contractor's system of property control, if approved by the property administrator. The Contractor shall be responsible for the adequate storage and protection of all salvaged materials and equipment and shall replace, at no cost to the Government, all salvage materials and equipment which are broken or damaged during salvage operations as the result of his negligence, or while in his care. (CENAB-EN-DT)

QUANTITY	DESCRIPTION
10	Cone Valve Actuators and Appurtenances

The above listed salvage materials shall become the property of the Government. The Contractor shall deliver such salvage material to a location on site as directed by the Contracting Officer. (CENAB)

1.12 ASBESTOS HANDLING AND REMOVAL (FEB 85)

Through site investigations, friable asbestos has not been found, however if asbestos is encountered, its testing, removal and disposal is covered in "CHANGES" clause of the Contract Clauses. (CENAB)

1.13 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

1.13.1 Procedure for Determination

This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance the contract clause entitled "Default: (Fixed Price Construction)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

- a. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
- b. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

1.13.2 Anticipated Adverse Weather Delays

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4	5	6	7	6	6	6	5	2	5	4	3

1.13.3 Impact

Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph "Anticipated Adverse Weather Delays", above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled "Default (Fixed Price Construction)".

1.14 WORKING HOURS

WORKING HOURS: (DEC 93) It shall be the Contractors responsibility to obtain the working hours other than the normal five (5) day work week 6:00 am to 3:30 pm, Monday through Friday.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

NOT APPLICABLE

ATTACHMENT

RISK ASSESSMENT CHECKLIST

-- End of Section --

RISK ASSESSMENT FOR
EXCAVATION AND OTHER WORK IN THE VICINITY OF UTILITIES

PROJECT NAME: _____

CONTRACT NUMBER: _____

PROJECT INSTALLATION AND LOCATION: _____

PROPOSED EXCAVATION START DATE: _____

1. ESTABLISH EXCAVATION DETAILS AND DRAWINGS (check when completed)
2. PROPOSED EXCAVATION AREA MARKED ("white lining") (check when completed)
3. CONTACT APPROPRIATE ONE-CALL SERVICE FOR PUBLIC UTILITIES:
MD: Miss Utility 1-800-257-7777 N Y : New York City - Long Island One Call Center 1-800-272-4480
N. VA: Miss Utility 1-800-552-7777 PA: Pennsylvania One-Call System Incorporated 1-800-242-1776
VA: Miss Utility of VA 1-800-552-7001 DC: Miss Utility 1-800-257-7777
ONE-CALL NATIONAL REFERRAL CENTER: 1-888-258-0808
- CONTACT INSTALLATION/OWNERS OF ALL PRIVATELY OWNED UTILITIES (NON ONE-CALL MEMBERS)
4. DATE UTILITIES MARKED AND METHOD OF MARKING
ONE-CALL LOCATORS _____
OTHER LOCATORS _____
5. CONTACT APPROPRIATE DPW REPRESENTATIVES AND COMPLY WITH INSTALLATION PERMIT REQUIREMENTS: _____
6. UTILITIES IDENTIFIED ON-SITE:
 NONE ELECTRIC GAS WATER TELEPHONE CATV SEWER OTHER _____
7. LEVEL OF RISK: (Based upon personnel safety and consequences of utility outages.)
 SEVERE: Excavation required within the immediate vicinity (<2-ft) of a MARKED utility.
 MODERATE: Excav. required outside the immediate vicinity (> 2-ft) of MARKED utility.
 MINIMAL: Excavation required in an area with NO utilities.
8. EXISTING FACILITIES/UTILITIES IN VICINITY:
 NON-CRITICAL MISSION CRITICAL HIGH-PROFILE CEREMONIAL
 OTHER _____
 CONSEQUENCES IF EXISTING UTILITIES ARE DAMAGED/DISRUPTED _____

9. ENGINEERING CONTROLS REQUIRED:
 NONE HAND EXCAVATE TO LOCATE UTILITY EXCAVATE WITH DUE CARE
 OTHER _____
10. ADMINISTRATIVE CONTROLS REQUIRED:
 Notification of Contracting Officer's Representative, NOTIFIED on: _____
 Notification of Installation/DPW Representative, NOTIFIED on: _____
11. EMERGENCY NOTIFICATION AT INSTALLATION: POC & PHONE NUMBER _____

THE INFORMATION NOTED ABOVE IS ACCURATE AND THE WORK IS READY TO PROCEED
SIGNED and DATE _____ CQC MANAGER

12. ON-SITE GOVERNMENT REP. RECOMMENDATION FOR APPROVAL TO EXCAVATE:
 YES NO SIGNATURE AND DATE: _____
Comments: _____
13. AREA ENGINEER APPROVAL TO EXCAVATE:
 APPROVED DENIED SIGNATURE AND DATE: _____
Comments: _____
14. CHIEF, _____ DIVISION APPROVAL TO EXCAVATE:
 APPROVED DENIED SIGNATURE AND DATE: _____
Comments: _____

SECTION 01060

SAFETY
01/01

PART 1 GENERAL

1.1 APPLICABLE PUBLICATION

The publications listed below form a part of this specification and are referred to in the text by the basic designation only. All interim changes (changes made between publications of new editions) to the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, will be posted on the Headquarters Website. The date that it is posted shall become the official effective date of the change and contracts awarded after this date shall require to comply accordingly. The website location where these changes can be found is under the button entitled "Changes to EM", located at: "http://www.hq.usace.army.mil/soh/hqusace_soh.htm".

U.S. ARMY CORPS OF ENGINEERS:

EM 385-1-1 (3 Sep 1996) U.S. Army Corps of Engineers
Safety and Health Requirements Manual

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-01 Preconstruction Submittals

Safety Supervisor; G WA

A safety supervisor shall be responsible for overall supervision of accident prevention activities.

SD-07 Certificates

Language Certification

It is the Contractors responsibility to ensure that all employees understand the basic english language.

SD-09 Manufacturer's Field Reports

Activity Phase Hazard Analysis Plan; G WA

The addressing of the activity phase hazard analysis plan for each activity performed in a phase of work.

Outline Report

A report for each past activities review.

OSHA Log

A log shall be reported monthly for injuries.

1.3 GENERAL

The U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and all subsequent revisions referred to in the Contract Clause ACCIDENT PREVENTION of this contract, are hereby supplemented as follows:

a. The Contractor shall designate an employee responsible for overall supervision of accident prevention activities. Such duties shall include: (1) assuring applicable safety requirements are (a) communicated to the workers in a language they understand (reference EM 385-1-1, September 1996, 01.A.04). It is the Contractor's responsibility to ascertain if there are workers on the job who do not speak and/or understand the English language, if such workers are employed by the prime contractor or subcontractors, at any tier, it is the prime contractor's responsibility to insure that all safety programs, signs, and tool box meetings are communicated to the workers in a language they understand, and that a bilingual employee is on site at all time. If the contractor contends that interpreters and/or bilingual signs are not required, language certification must be provided which verifies that all workers (whose native tongue is other than English) have a command of the English language sufficient to understand all direction, training and safety requirements, whether written or oral, and (b) incorporated in work methods, and (2) inspecting the work to ensure that safety measures and instructions are actually applied. The proposed safety supervisor name and qualifications shall be submitted in writing for approval to the Contracting Officer's Representative. This individual must have prior experience as a safety engineer or be able to demonstrate his/her familiarity and understanding of the safety requirements over a prescribed trial period. The safety engineer shall have the authority to act on behalf of the Contractor's general management to take whatever action is necessary to assure compliance with safety requirements. The safety supervisor is required to be on the site when work is being performed.

b. Prior to commencement of any work at a job site, a preconstruction safety meeting shall be held between the Contractor and the Corps of Engineers Area/Resident Engineer to discuss the Contractor's safety program and in particular to review the following submittals:

(1) Contracts Accident Prevention Plan: An acceptable accident prevention plan, written by the prime Contractor for the specific work and implementing in detail the pertinent requirements of EM 385-1-1, shall be submitted for Government approval.

(2) Activity Phase Hazard Analysis Plan: Prior to beginning each major phase of work, an activity hazard analysis (phase plan) shall be prepared by the Contractor for that phase of work and submitted to the Contracting Officer's Representative for approval. A phase is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform work. The analysis shall address the hazards for each activity performed in the phase and shall present the procedures and safeguards necessary to eliminate the hazards or reduce the risk to an acceptable level.

c. Subsequent jobsite safety meetings shall be held as follows:

(1) A safety meeting shall be held at least once a month for all supervisors on the project to review past activities, to plan ahead for new or changed operations and to establish safe working procedures to anticipated hazards. An outline report of each monthly meeting shall be submitted to the Contracting Officer's Representative.

(2) At least one safety meeting shall be conducted weekly, or whenever new crews begin work, by the appropriate field supervisors or foremen for all workers. An outline report of the meeting giving date, time, attendance, subjects discussed and who conducted it shall be maintained and copies furnished the designated authority on request.

1.4 ACCIDENTS

Chargeable accidents are to be investigated by both Contractor personnel and the Contracting Officer.

1.4.1 Accident Reporting, ENG FORM 3394

Section 1, Paragraph 01.D, OF EM 385-1-1 and the Contract Clause entitled ACCIDENT PREVENTION are amended as follows: The prime Contractor shall report on Eng Form 3394, supplied by the Contracting Officer, all injuries to his employees or subcontractors that result in lost time and all damage to property and/or equipment in excess of \$2,000 per incident. Verbal notification of such accident shall be made to the Contracting Officer within 24 hours. A written report on the above noted form shall be submitted to the Contracting Officer within 72 hours following such accidents. The written report shall include the following:

a. A description of the circumstances leading up to the accident, the cause of the accident, and corrective measures taken to prevent recurrence.

b. A description of the injury and name and location of the medical facility giving examination and treatment.

c. A statement as to whether or not the employee was permitted to return to work after examination and treatment by the doctor, and if not, an estimate or statement of the number of days lost from work. If there have been days lost from work, state whether or not the employee has been re-examined and declared fit to resume work as of the date of the report.

1.4.2 OSHA Requirements

1.4.2.1 OSHA Log

A copy of the Contractor's OSHA Log of Injuries shall be forwarded monthly to the Contracting Officer.

1.4.2.2 OSHA Inspections

Contractors shall immediately notify the Contracting Officer when an OSHA Compliance official (Federal or State representative) presents his/her credentials and informs the Contractor that the workplace will be inspected for OSHA compliance. Contractors shall also notify the Contracting Officer upon determination that an exit interview will take place upon completion of the OSHA inspection. (NABSA OCT 05, 1976)

1.5 GOVERNMENT APPROVAL

Submittals shall be in accordance with Section 01330 SUBMITTAL PROCEDURES. All required submittals of items specified in this section shall be for information only, except for those items including, but not limited to, the following which shall be submitted for Government approval:

- a. Written designation of safety representative.
- b. Written project specific accident prevention plan.
- c. Written activity phase hazard analysis plan.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01200

WARRANTY REQUIREMENT
01/01

PART 1 GENERAL

1.1 WARRANTY OF CONSTRUCTION

The Contractor shall warranty all materials and workmanship in accordance with Contract Clause (FAR 52.246-21), "WARRANTY OF CONSTRUCTION"

1.2 MANUFACTURER'S WARRANTY:

The Contractor shall provide manufacturer's warranties, when available, on all equipment for one year starting from the day of facility acceptance by the Government. Any warranty offered by the manufacturer for periods greater than one year or required by other sections of the specifications shall also be provided.

1.3 WARRANTY PAYMENT

Warranty work is a subsidiary portion of the contract work, and has a value to the Government of \$61,000. The Contractor will assign a value of that amount in the breakdown for progress payments mentioned in the Contract Clause (FAR 52.232-5) "Payments Under Fixed-Price Construction". If the Contractor fails to respond to warranty items as provided in paragraph CONTRACTOR'S RESPONSE TO WARRANTY SERVICE REQUIREMENTS below, the Government may elect to acquire warranty repairs through other sources and, if so, shall backcharge the Contractor for the cost of such repairs. Such backcharges shall be accomplished under the Contract Clause (FAR 52.243-4) "CHANGES" of the contract through a credit modification(s).

1.4 PERFORMANCE BOND:

The Contractor's Performance Bond will remain effective throughout the construction warranty period and warranty extensions.

1.4.1 Failure to Commence

In the event the Contractor or his designated representative(s) fail to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Contracting Officer shall have the right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Contracting Officer shall have the work performed by others, and after completion of the work, may demand reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.5 PRE-WARRANTY CONFERENCE:

Prior to contract completion and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this

specification. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty shall be reviewed at this meeting. The Contractor shall provide names, addresses, and telephone numbers of all subcontractors, equipment suppliers, or manufacturers with specific designation of their area of responsibilities if they are to be contacted directly on warranty corrections. This point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. Minutes of the meeting will be prepared by the Government and signed by both, the Contractor and the Contracting Officer. The minutes shall become part of the contract file.

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-04 Samples

Sample Tags

To identify the warranty for all Contractor and Government furnished equipment which the Contractor installs.

1.7 ADDITIONAL REQUIREMENTS

1.7.1 Equipment Warranty Identification Tags:

The Contractor shall provide warranty identification tags on all Contractor and Government furnished equipment which he has installed.

1.7.1.1 Format and Size for Tags

The tags shall be similar in format and size to the exhibits provided by this specification, they shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Contractor furnished equipment that has differing warranties on its components will have each component tagged.

1.7.1.2 Sample Tags

Sample tags shall be filled out representative of how the Contractor will complete all other tags. These tags shall be submitted to the Government.

1.7.1.3 Tags for Warranted Equipment:

The tag for this equipment shall be similar to the following. Exact format and size will be as approved.

EQUIPMENT WARRANTY CONTRACTOR FURNISHED EQUIPMENT	
MFG: _____	MODEL NO.: _____
SERIAL NO.: _____	CONTRACT NO.: _____
CONTRACTORS NAME: _____	
CONTRACTOR WARRANTY EXPIRES: _____	
MFG WARRANTY (IES) EXPIRE: _____	

EQUIPMENT WARRANTY GOVERNMENT FURNISHED EQUIPMENT	
MFG: _____	MODEL NO.: _____
SERIAL NO.: _____	CONTRACT NO.: _____
DATE EQUIPMENT PLACED IN SERVICE: _____	
MFG WARRANTY (IES) EXPIRES: _____	

1.7.1.4 Execution

The Contractor will complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment. All tags shall be mechanically attached to the equipment as directed by the Contracting Officer.

1.7.1.5 Equipment Warranty Tag Replacement.

The contractor shall provide new tags on repaired or replaced equipment during the warranty period. The tag shall be identical to the original tag, except that the Contractor's warranty expiration date shall be updated to show the correct warranty expiration date.

1.8 CONTRACTOR'S RESPONSE TO WARRANTY SERVICE REQUIREMENTS.

1.8.1 Notification to Warranty Service Requirements

Following oral or written notification by authorized representative of the installation designated in writing by the Contracting Officer, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below.

1.8.1.1 Categories of Priorities

- a. First Priority Code 1: Perform on site inspection to evaluate situation, determine course of action, initiate work within 24 hours and work continuously to completion or relief.
- b. Second Priority Code 2: Perform on site inspection to evaluate situation, determine course of action, initiate work within 48 hours and work continuously to completion or relief.
- c. Third Priority Code 3: All other work to be initiated within 5 work days end work continuously to completion or relief.

1.8.1.2 Warranty Service Priority List

ELECTRICAL:

Code 1:

- a. Power failure (entire area or any building operational after 1600 hours).
- b. Traffic control devices.
- c. Security lights.

Code 2:

- a. Power failure (no Power to a room or part of building),
- b. Receptacle and lights.
- c. Fire alarm systems.

GAS

Code 1

- a. Leaks and breaks.

INTRUSION DETECTION SYSTEMS

Code 1

- a. High security areas.

Code 2

- a. Systems other than those listed under Code 1.

PLUMBING

Code 2

- a. Flush valves.
- b. Fixture drain, supply line commode, or water pipe leaking.

ROOF LEAKS

Code 1

- a. Temporary repairs will be made where major damage to property is occurring.

Code 2

- a. Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

WATER (Exterior)

Code 1

- a. Normal operation of water pump station.

Code 2

- No water to facility.

SPRINKLER SYSTEM

Code 1

- a. All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinkler

1.8.2 Availability of Required Parts

Should parts be required to complete the work and the parts are not immediately available the Contractor shall have a maximum of 12 hours after arrival at the job site to provide authorized representative of the installation with firm written plan for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractors plan shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair.

PART 2 PRODUCTS - NOT APPLICABLE

PART 3 EXECUTION - NOT APPLICABLE

-- End of Section --

SECTION 01320
PROJECT SCHEDULE
09/99

PART 1 GENERAL

1.1 REFERENCE

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.

ENGINEERING REGULATIONS (ER)

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

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Initial Project Schedule; G WA.

Shows sequence of activities for work through the entire project and shall be at a reasonable level of detail.

Preliminary Project Schedule; G WA

Payment Purpose.

Periodic Schedule Updates; G WA

These updates enable the Contracting Officer to assess Contractor's progress.

Qualifications; G WA

Documentation showing qualifications of personnel preparing schedule reports.

Narrative Report; G WA Schedule Reports; G WA

Three copies of the reports showing numbers, descriptions, dates, float, starts, finishes, durations, sequences, etc., as required.

1.3 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 construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. 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, then 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 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.

3.3.2.3 Government Activities

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

3.3.2.4 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.

3.3.2.5 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.

3.3.2.6 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.

3.3.2.7 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.

3.3.2.8 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.

3.3.2.9 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 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.

3.3.2.10 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.

3.3.2.11 Specification Section

All activities shall be identified in the project schedule according to the specification section to which the activity belongs.

3.3.3 Scheduled Project Completion

The schedule interval shall extend from Notice-to-Proceed to the contract completion date.

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date on which the Notice to Proceed (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 call "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 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 Notice to Proceed is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after Notice to Proceed.

3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 40 calendar days after Notice to Proceed. 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 or to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgement 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, 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. Preceding 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 Notice to Proceed 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 must 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 Notice to Proceed 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 plan prosecution and progress of the work.

3.7 SPECIFIC PROJECT SCHEDULE REQUIREMENTS

It is anticipated that schedule limitations (reference section 01520, MAINTENANCE OF PUMPING STATION OPERATIONS DURING CONSTRUCTION) will dictate that outages required to perform all work specified will require two winter seasons. The Contractor shall prepare his schedule with the understanding that much of the season-dependent work shall be completed in the second cold season starting October 2004. No claim for additional compensation for delay will be accepted for work scheduled and completed within the contract performance period.

3.8 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.

3.8.1 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.

3.8.2 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 Notice to Proceed 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.

3.8.3 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.

3.9 DIRECTED CHANGES

If Notice to Proceed (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.

3.10 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.

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES
09/00

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION

Submittals required are identified by SD numbers and titles as follows:

1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.2.1 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."

1.2.2 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. Submittal Register ENG FORM 4288, column labeled "Reviewer", this column is blank and is understood that the reviewer is "AR" (Area Office).

1.3 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.

1.4 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. 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.

1.5 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

PART 2 PRODUCTS (Not used)

PART 3 EXECUTION

3.1 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.

3.2 SUBMITTAL REGISTER

At the end of this section is one set of ENG Form 4288 listing 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 will also be given the submittal register files, containing the computerized ENG Form 4288 and instructions on the use of the files. These submittal register files will be furnished on the Award CD-ROM disk a separate diskette. Columns "c" through "f" have been completed by the Government; the Contractor shall complete columns "a" and "g" through "i" and submit the forms (hard copy plus associated electronic file) to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The Contractor shall keep this diskette up-to-date and shall submit it to the Government together with the monthly payment request. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated.

At the end of this section is one set of ENG Form 4288 listing 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 submittal register for the project in accordance with Section 01312 RESIDENT MANAGEMENT SYSTEM (RMS).

3.3 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 30 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.

3.4 TRANSMITTAL FORM (ENG FORM 4025)

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 30 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.

3.5 SUBMITTAL PROCEDURE

Six (6) copies of submittals shall be made as follows:

3.5.1 Procedures

In the signature block provided on ENG Form 4025 the Contractor certifies that each item has been reviewed in detail and is correct and is in strict conformance with the contract drawings and specifications unless noted otherwise. The accuracy and completeness of submittals is the responsibility of the Contractor. Any costs due to resubmittal of documents caused by inaccuracy, lack of coordination, and/or checking shall be the responsibility of the Contractor. This shall include the handling and review time on the part of the Government. Each variation from the contract specifications and drawings shall be noted on the form; and, attached to the form, the Contractor shall set forth, in writing, the reason for and description of such variations. If these requirements are not met, the submittal may be returned for corrective action.

3.5.2 Responsibility

The Contractor is responsible for the total management of his work. The quantities, adequacy and accuracy of information contained in the submittals are the responsibility of the Contractor. Approval actions taken by the Government will not in any way relieve the Contractor of his quality control requirements.

3.5.2.1 Additional Requirements

The above is in addition to the requirements set forth in Contract Clause entitled "Specifications and Drawings for Construction". (ER 415-1-10).

3.5.4 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variations" 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.

3.6 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."

3.7 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. Four (4) copies of the submittal will be retained by the Contracting Officer and two (2) copies of the submittal will be returned to the Contractor.

3.8 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.

3.9 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: _____

3.10 CERTIFICATES OF COMPLIANCE: (MAY 1969)

Any Certificate required for demonstrating proof of compliance of materials with specification requirements shall be executed in four (4) copies. Each certificate shall be signed by an official authorized to certify in behalf on the manufacturing company and shall contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material, if, after tests are performed on selected samples, the material is found not to meet the specific requirements. (CENAB)

-- End of Section --

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR															
DALECARLIA		TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS	
(a)	(b)						(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)			(k)
		01000		SD-01 Preconstruction Submittals													
				Title Evidence	1.5												
				Invoice Copies	1.6												
				Photographs	1.12												
				SD-03 Product Data													
				Cost or Pricing Data	1.6												
				Equipment Data	1.7												
				SD-10 Operation and Maintenance													
				Data													
				O and M Data	1.8												
		01050		SD-01 Preconstruction Submittals													
				Shut Down Utility Services	1.4.2												
				Checklist	1.4.3												
		01060		SD-01 Preconstruction Submittals													
				Safety Supervisor	1.3												
				SD-07 Certificates													
				Language Certification	1.3												
				SD-09 Manufacturer's Field													
				Reports													
				Activity Phase Hazard Analysis	1.3												
				Plan													
				Outline Report	1.3												
				OSHA Log	1.4.2.1												
		01200		SD-04 Samples													
				Sample Tags	1.7.1.2												
		01320		SD-01 Preconstruction Submittals													

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR																
DALECARLIA	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH#	CLASSIFICATION	GOVT OR A/E REVIEW	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS		
							APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	ACTION CODE	DATE OF ACTION	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTHER REVIEWER			ACTION CODE	DATE OF ACTION
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01320	Initial Project Schedule	3.4.2	G WA													
			Preliminary Project Schedule	3.4.1	G WA													
			Periodic Schedule Updates	3.4.3	G WA													
			Qualifications	1.3	G WA													
			Narrative Report	3.5.2	G WA													
			Schedule Reports	3.5.4	G WA													
		01451	SD-01 Preconstruction Submittals															
			CQC Plan	3.2	G WA													
			CQC Mgr Qualification	3.4.2	G WA													
			SD-05 Design Data															
			Notification of Changes	3.2.4	FIO													
			Punchlist	3.8.1	FIO													
			Minutes	3.3	FIO													
			SD-06 Test Reports															
			Tests	3.7.1	FIO													
			Documentation	3.9	FIO													
			Tests Performed	3.7.1	FIO													
			QC Records	3.7.1	G WA													
		01510	SD-02 Shop Drawings															
			Temporary Electrical Work	1.5	G WA													
		01520	SD-01 Preconstruction Submittals															
			Construction Sequence Plan	1.4	G WA													
		01561	SD-01 Preconstruction Submittals															
			Facility Plan	1.9.4	G WA													
			Temporary Plan	1.9.5	G WA													
		01720	SD-11 Closeout Submittals															

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR															
ACTIVITY	TRANSMITTAL NO	SPEC SECTION	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVERNOR'S REVIEW	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			REMARKS	
								APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	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)
	01720			Progress Prints	1.4	G WA											
				Final Requirements	1.6	G WA											
				CADD Files	1.6	FIO											
	01735			SD-08 Manufacturer's Instructions													
				Instructor Qualifications	1.4.1	G WA											
				Training Manuals	1.3.1	G WA											
	02220			SD-03 Product Data													
				Work Plan	1.9	G WA											
				SD-07 Certificates													
				Demolition plan	1.9	G WA											
				Notifications	1.4.1	G WA											
				Notification of Demolition and Renovation forms	1.4.1	G WA											
	02231			SD-03 Product Data													
				Nonsaleable Materials	3.6.1	FIO											
				SD-04 Samples													
				Tree wound paint	2.1	G WA											
	02316A			SD-06 Test Reports													
				Field Density Tests	3.4.3	G WA											
				Testing of Backfill Materials	3.4.2	G WA											
	02921A			SD-03 Product Data													
				Equipment	3.1.3	FIO											
				Delivery	1.4.1	G WA											
				Finished Grade and Topsoil	3.2.1	G WA											
				Topsoil	1.4.1.1	G WA											
				Topsoil	2.2	G WA											

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR															
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARAGRAPH#	CLASSIFICATION	GOVERNOR'S REVIEW	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
								APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	ACTION CODE	DATE OF ACTION	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	02921A			Soil Amendments	2.3		G WA										
				Mulch	2.4		G WA										
				Asphalt Adhesive	2.5		G WA										
				Surface Erosion Control Material	2.8		G WA										
				Quantity Check	3.5		G WA										
				Seed Establishment Period	3.9		G WA										
				Maintenance Record	3.9.3.4		G WA										
				Application of Pesticide	3.6		G WA										
				SD-06 Test Reports													
				Equipment Calibration	3.1.3		FIO										
				Soil Test	3.1.4		G WA										
				SD-07 Certificates													
				Seed	2.1		G WA										
				pH Adjuster	2.3.1		G WA										
				Fertilizer	2.3.2		G WA										
				Pesticide	2.7		G WA										
	09900			SD-02 Shop Drawings													
				Piping identification stencil	3.6		FIO										
				SD-03 Product Data	3.6		FIO										
				Coating	2.1		G AE										
				Manufacturer's Technical Data Sheets	2.1		FIO										
				SD-04 Samples													
				Color	1.8		G WA										
				SD-07 Certificates													

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TITLE AND LOCATION		CONTRACTOR															
TRANSMITTAL NO	SPEC SECT	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARRA # RAPH	CLASSIFICATION	GOVERNOR VIEW	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			REMARKS		
							APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE FWD TO APPR AUTH/	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	DATE OF ACTION	DATE RCD FRM APPR AUTH		ACTION CODE	DATE OF ACTION
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
09900			Applicator's qualifications	1.3	FIO												
			SD-08 Manufacturer's Instructions														
			Application instructions	3.2.1	FIO												
			Mixing	3.4.2	FIO												
			Manufacturer's Material Safety Data Sheets	1.6.2	FIO												
			SD-10 Operation and Maintenance Data														
			Coatings:	2.1	G WA												
13281			SD-03 Product Data														
			Lead Based Paint (LBP) Inventory Statements	1.7	G WA												
			Materials and Equipment	1.19	G WA												
			Expendable Supplies	1.20	G WA												
			Qualifications	1.5	G WA												
			SD-06 Test Reports														
			Licences, Permits, and Notifications	1.12	G WA												
			Accident Prevention Plan (APP)	1.8	G WA												
			Sampling and Analysis	1.14	G WA												
			analytical results	3.7	FIO												
			Clearance Report	3.8	G WA												
13405A			SD-02 Shop Drawings														
			Installation	3.1.1	G AE												
			Wiring	3.1.1	G AE												
			SD-03 Product Data														

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR															
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARAGRAPH#	CLASSIFICATION	GOVT OR A/E REVIEW	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)
	13405A			Instrumentation and Control System	3.7		G WA										
				Meters and Sensors	2.1		G WA										
				Performance Verification Test (PVT)	3.5.2		G WA										
				Factory Test Procedure	2.6.2		G WA										
				SD-06 Test Reports													
				Factory Test Report	2.7.3		G WA										
				Testing, Adjusting and Commissioning	3.5.1		G WA										
				Performance Verification Test(PVT)	3.5.2		G WA										
				Endurance Test	3.5.3		G WA										
				SD-07 Certificates													
				Sensor and Control Wiring	3.3.2.2		G WA										
				Testing of Ground Rods	3.5.1		G WA										
				SD-10 Operation and Maintenance Data													
				Instrumentation and Control System	3.7		G WA										
	13621			SD-02 Shop Drawings													
				Input/Output Components	2.1		G AE										
				SCADA Workstation			G AE										
				SD-08 Manufacturer's Instructions													
				Software Services	3.2		G AE										
				Software Services	3.11.2		G AE										

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR															
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARAGRAPH#	CLASSIFICATION	GOVT OR CLAS	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
								APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	ACTION CODE	DATE OF ACTION	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTHER REVIEWER		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	13621			Warranty	3.13		G WA										
				SD-09 Manufacturer's Field Reports													
				Checkout Plan	3.3		G AE										
				Test Report	3.3		G AE										
				SD-07 Certificates													
				Installation	3.1		G WA										
				Certification of Compliance	3.9		G AE										
				SD-10 Operation and Maintenance													
				Data													
				Operator's Manuals	3.11.1		G WA										
				Engineer's Manual	3.11.2		G WA										
	13622			SD-02 Shop Drawings													
				Installation	3.4.1		G AE										
				Wiring	3.5		G AE										
				SD-03 Product Data													
				Data Historian System	2.1		G AE										
				Performance Verification Test (PVT)	3.5.6		G AE										
				Factory Test Procedure	2.13.2		G AE										
				SD-06 Test Reports													
				Factory Test Report	2.13.3		G AE										
				Testing, Adjusting and Commissioning	3.6.1		G AE										
				Endurance Test	3.6.3		G AE										

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR																
ACTIVITY	TRANSMITTAL NO	SPEC	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS		
							APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	ACTION CODE	DATE OF ACTION	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTHER REVIEWER			ACTION CODE	DATE OF ACTION
(a)	(b)	(c)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
			13622	SD-10 Operation and Maintenance Data														
				Data Historian System	2.1	G AE												
			15201	SD-03 Product Data														
				Qualifications	1.5	G AE												
				Installation Certification	3.2	G WA												
				Delivery, Storage and Handling	1.7	G WA												
				Materials and Equipment	2.1	G AE												
				Installation	1.10.2	G AE												
				Valve Schedule	2.1.2	G G												
			15202	SD-02 Shop Drawings														
				Pipe and Equipment	3.1.1	G AE												
				SD-03 Product Data														
				Qualifications	1.5	G AE												
				Welders	1.5.2	G AE												
				Waste Water Disposal	3.4	G WA												
				Assistance and Training		G WA												
				Delivery, Storage and Handling	1.7	G AE												
				Materials and Equipment		G AE												
			15500	SD-01 Preconstruction Submittals														
				Certifications	1.2.5	G WA												
				SD-09 Manufacturer's Field Reports														
				Site Evaluation and Preparations	1.1	G WA												
				HVAC System Component Inspection	1.1	G WA												

SUBMITTAL REGISTER

TITLE AND LOCATION		CONTRACTOR															
ACTIVITY	TRANSMITTAL NO	SPEC	DALECARLIA	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			REMARKS		
							APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	DATE OF ACTION		DATE RCD FRM APPR AUTH	MAILED TO CONTR/
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	15500			Post-project Report	3.4.1	G WA											
	16081			SD-06 Test Reports													
				Acceptance tests and inspections	3.1	G WA											
				SD-07 Certificates													
				Qualifications	1.4.1	G WA											
				Acceptance test and inspections procedure	1.4.2	G WA											
	16402			SD-03 Product Data													
				Switches	2.11	G WA											
				Receptacles	2.12	G WA											
				Panelboards	2.13	G WA											
				Circuit Breakers	2.13.2	G WA											
				SD-06 Test Reports													
				Grounding system test													
	16710			SD-02 Shop Drawings													
				Premises Distribution System	1.7	G WA											
				Installation	3.1	G WA											
				SD-03 Product Data													
				Record Keeping and Documentation	1.8	G WA											
				Spare Parts	3.1.9	G WA											
				Manufacturer's Recommendations	3.1.2	G WA											
				Test Plan	3.6	G WA											
				Qualifications	1.5	G WA											
				SD-06 Test Reports													
				Test Reports	3.6	FIO											

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required numbers of copies.
2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.
3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288 for each entry on this form.
4. Submittals requiring expeditious handling will be submitted under a separate form.
5. Separate transmittal form will be used for submittals under separate sections of the specifications.
6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications -- also a written statement to that effect shall be included in the space provided for "Remarks".
7. Form is self transmitting, letter of transmittal is not required.
8. When a sample of a material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I
9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column I to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated in Section I, Column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

- | | | | |
|------|---|-------|--|
| A -- | Approved as submitted | E -- | Disapproved (See Attached) |
| B -- | Approved, except as noted on drawings. | F -- | Receipt acknowledged |
| C -- | Approved except as noted on drawings.
Refer to attached sheet resubmission required. | FX -- | Receipt acknowledged, does not comply
as noted with contract requirements |
| D -- | Will be returned by separate correspondence. | G -- | Other (Specify) |

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

SECTION 01451

CONTRACTOR QUALITY CONTROL
11/01

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 D 3740	(1999b) 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	(1998a) 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 Price Schedule.

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-01 Preconstruction Submittals

CQC Plan; G WA

Identifies personnel, procedures, control, instructions, test, records, and forms to be used.

CQC Mgr Qualification; G WA

The evaluation of the project to determine the level of CQC System Manager required.

SD-05 Design Data

Notification of Changes

Any changes made by the Contractor.

Punchlist

Near the completion of all work, the CQC System Manager shall prepare a list of items which do not conform to the approved drawings and specifications.

Minutes

Prepared by the Government and signed by both the Contractor and the Contracting Officer and shall become a part of the contract file.

SD-06 Test Reports

Tests

Specified or required tests shall be done by the Contractor to verify that control measures are adequate.

Documentation

Results of tests taken.

Tests Performed

An information copy provided directly to the Contracting Officer.

QC Records; G WA

Provide factual evidence that required quality control activities and/or tests have been performed.

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 CQC PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than

30 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 60 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.

3.2.2 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. The Contractor shall include a copy of his proposed laboratory's latest Corps of Engineers inspection report in the Quality Control Plan. The inspection report details the tests that the lab has been validated to perform under Corps of Engineers contracts. (Laboratory facilities will be approved by the Contracting Officer.)
- 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.

3.2.3 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.

3.2.4 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 14 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, show 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 (CQC MGR Qualification)

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 construction person with a minimum of 10 years in related work. 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: electrical, and mechanical. These individuals may be employees of the prime or subcontractor; 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.

<u>Area</u>	<u>Qualifications</u>
a. Mechanical	Graduate Mechanical Engineer with 2 yrs experience or person with 5 yrs related experience
b. Electrical	Graduate Electrical Engineer with 2 yrs related experience or person with 5 yrs related experience
c. Submittals	Submittal Clerk with 1 yr experience

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors" within 45 calendar days after NTP is a mandatory requirement for the position of the Quality Control Systems Manager. Certification is good for five (5) years at which time re-training is required. The Contractor's QC Systems Manager may be appointed and serve fully in that capacity pending certification. If the CQC Systems Manager fails to successfully complete the training, the Contractor should promptly appoint a new CQSM who shall then attend the next available course. The course is nine (9) hours long (1 day). The Construction Quality Management Course (CQMC) will be taught at least nine (9) times per year by the Baltimore District Corps of Engineers, at various locations around Baltimore and Washington, DC, or at another site if conditions warrant. The CQMC cost will be borne by the Contractor and is one hundred and twenty-five dollars (\$125.00) per course, per person. Payment shall be made by check payable to either sponsors of the course: Associated Builders and Contractors, Inc, (ABC) 14120 Park Long Court, Suite 111, Chantilly, Virginia 20151 (Phone: 703-968-6205), or to The Associated General Contractors of America (AGC), Maryland Chapter, 1301 York Road, Heaver Plaza, Suite 202, Lutherville, Maryland 21093 (Phone: 410-321-7870) prior to the start of the course. Reservations to attend the course should be made directly to the organization sponsoring the course they attend. The Contractor has forty-five (45) calendar days to attend the course after the issuance of the NTP. The contractor shall contact the Contracting Officer upon award of the contract for arrangements for the course.

3.4.5 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

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.

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 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 72 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 72 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 for QC records. 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.

3.7.2.2 Laboratory Approval

The Contractor shall use a testing laboratory that has been previously approved by the Corps of Engineers or obtain approval for a laboratory established at the project site. Approved laboratories are listed at the following web site: <http://www.wes.army.mil/SL/MTC/ValStatesTbl.htm> If the Contractor elects to set up an on-site laboratory at the project site, the Contractor will be assessed \$4500.00 for the cost of inspection of this lab by the Corps of Engineers.

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

Furnishing or Transportation of Samples for Testing: Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the following address:

Field Exploration Unit
or
Soils Laboratory Unit
(indicate which on shipping or mailing forms)
Fort McHenry Yard
Baltimore, Maryland 21230"

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause in Section 00800 of the Solicitation entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a punchlist of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and 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 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 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. Off-site 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 24 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 --

Contractor's Name:	_____
Address:	_____ _____
Phone Number:	_____

CONSTRUCTION QUALITY CONTROL REPORT

PROJECT NAME: _____
 LOCATION: _____ DATE: _____
 CONTRACT NUMBER: _____ REPORT NO.: _____

SUPERINTENDENT: _____			
TYPE OF WORKERS	NUMBER	TYPES OF CONSTRUCTION EQUIPMENT ON SITE	NUMBER
SUBCONTRACTORS			
COMPANY	RESPONSIBILITY	FOREMAN	NO. OF WORKERS
TOTALS			
NO. OF WORKERS TODAY	MANHOURS TODAY	MANHOURS FOR THIS PERIOD	
CONTRACT MATERIALS AND EQUIPMENT DELIVERED TO SITE:			
WEATHER: _____		SITE CONDITIONS: _____	
DID A DELAY OR WORK STOPPAGE OCCUR TODAY? _____ IF YES, EXPLAIN.			
HAS ANYTHING DEVELOPED IN THE WORK WHICH MAY LEAD TO A CHANGE OR FINDING OF FACT? _____ IF YES, EXPLAIN.			

DESCRIPTION OF ALL WORK PERFORMED TODAY
(LIST BY DEFINABLE FEATURES OF WORK)

PREPARATORY INSPECTION:

LIST ALL INSPECTIONS BY SUBJECT AND SPECIFICATION LOCATION.
ATTACH MINUTES OF MEETING AND LIST OF ALL ATTENDEES.

HAVE ALL REQUIRED SUBMITTALS AND SAMPLES OF CONSTRUCTION BEEN
APPROVED.

DO THE MATERIALS AND EQUIPMENT TO BE USED CONFORM TO THE SUBMITTALS?

HAS ALL PRELIMINARY WORK BEEN INSPECTED, TESTED, AND COMPLETED?

TEST REQUIRED AND INSPECTION TECHNIQUES TO BE EXECUTED TO PROVE
CONTRACT COMPLIANCE (INCLUDE BOTH EXPECTED AND ACTUAL RESULTS)

HAS A PHASE HAZARD ANALYSIS BEEN PERFORMED?

COMMENTS AND DEFICIENCIES NOTED AND CORRECTIVE ACTIONS TAKEN:

ALL INSTRUCTIONS RECEIVED FROM QA PERSONNEL AND ACTIONS TAKEN:

JOB SAFETY (INCLUDE MEETINGS HELD AND DEFICIENCIES NOTED WITH CORRECTIVE ACTIONS):

INITIAL INSPECTION:

LIST ALL INSPECTIONS BY SUBJECT AND SPECIFICATION LOCATION.
COMMENTS AND/OR DEFICIENCIES NOTED AND CORRECTIVE ACTION TAKEN:

FOLLOW-UP INSPECTION:

LIST ALL INSPECTIONS BY SUBJECT AND SPECIFICATION LOCATION.
COMMENTS AND/OR DEFICIENCIES NOTED AND CORRECTIVE ACTION TAKEN.

SIGNATURE: _____
QUALITY CONTROL REPRESENTATIVE/MANAGER

THE ABOVE REPORT IS COMPLETE AND CORRECT. ALL MATERIALS AND EQUIPMENT USED AND ALL WORK PERFORMED DURING THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT SPECIFICATIONS, AND SUBMITTALS, EXCEPT AS NOTED ABOVE.

SIGNATURE: _____
CONTRACTOR'S APPROVED AUTHORIZED REPRESENTATIVE

SECTION 01510

TEMPORARY CONSTRUCTION ITEMS
01/01

PART 1 GENERAL

1.1 General

The work covered by this section consists of furnishing all labor, materials, equipment, and services and performing all work required for or incidental to the items herein specified. No separate payment will be made for the construction and services required by this section, and all costs in connection therewith shall be included in the overall cost of the work unless specifically stated otherwise.

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

Temporary Electrical Work; G WA

The Contractor shall submit a temporary power distribution sketch prior to the installation of any temporary power.

1.3 PROJECT SIGN: (AUG 1974)

A project sign shall be provided and erected at a location designated by the Contracting Officer. The sign shall conform to the requirements as shown on Attachment No. 1, a copy of which is attached hereto. The sign shall be erected as soon as possible and within 15 days after the date of receipt of notice to proceed. Upon completion of the project, the sign shall be removed and disposed of by the Contractor. (CENAB)

1.4 SAFETY SIGN (AUG 1974)

A safety sign shall be provided and erected at a location designated by the Contracting Officer. The sign shall conform to the requirements as shown on Attachment No. 2, a copy of which is attached hereto. The sign shall be erected as soon as possible and within 15 days after the date of receipt of notice to proceed. The data required by the sign shall be corrected daily, with light colored metallic or non-metallic numerals. Numerals, including mounting hardware, shall be subject to the approval of the Contracting Officer. Upon completion of the project, the sign shall be removed and disposed of by the Contractor. (CENAB)

1.5 TEMPORARY ELECTRICAL WORK: (APR 1962 REV JUL 2000)

Temporary electrical work shall be in accordance with Sections 7 and 11 of EM 385-1-1 U.S. Army Corps of Engineers Safety and Health Requirements

Manual. The Contractor shall submit for approval a temporary power distribution sketch prior to the installation of any temporary power. The sketch shall include location, voltages, and means of protection for all temporary distribution system wiring and components to include lighting, receptacles, grounding, disconnecting means, and GFCIs. The Contractor shall test the temporary power system and devices for polarity, ground continuity, and ground resistance prior to the initial use and before use after any modification. The Contractor shall verify to the satisfaction of the Contracting Officer or his representative by a calibrated light meter that the minimum illumination required by Table 7-1 of the EM 385-1-1 is being provided. (CENAB-EN-DT)

PART 2 PRODUCT
NOT APPLICABLE

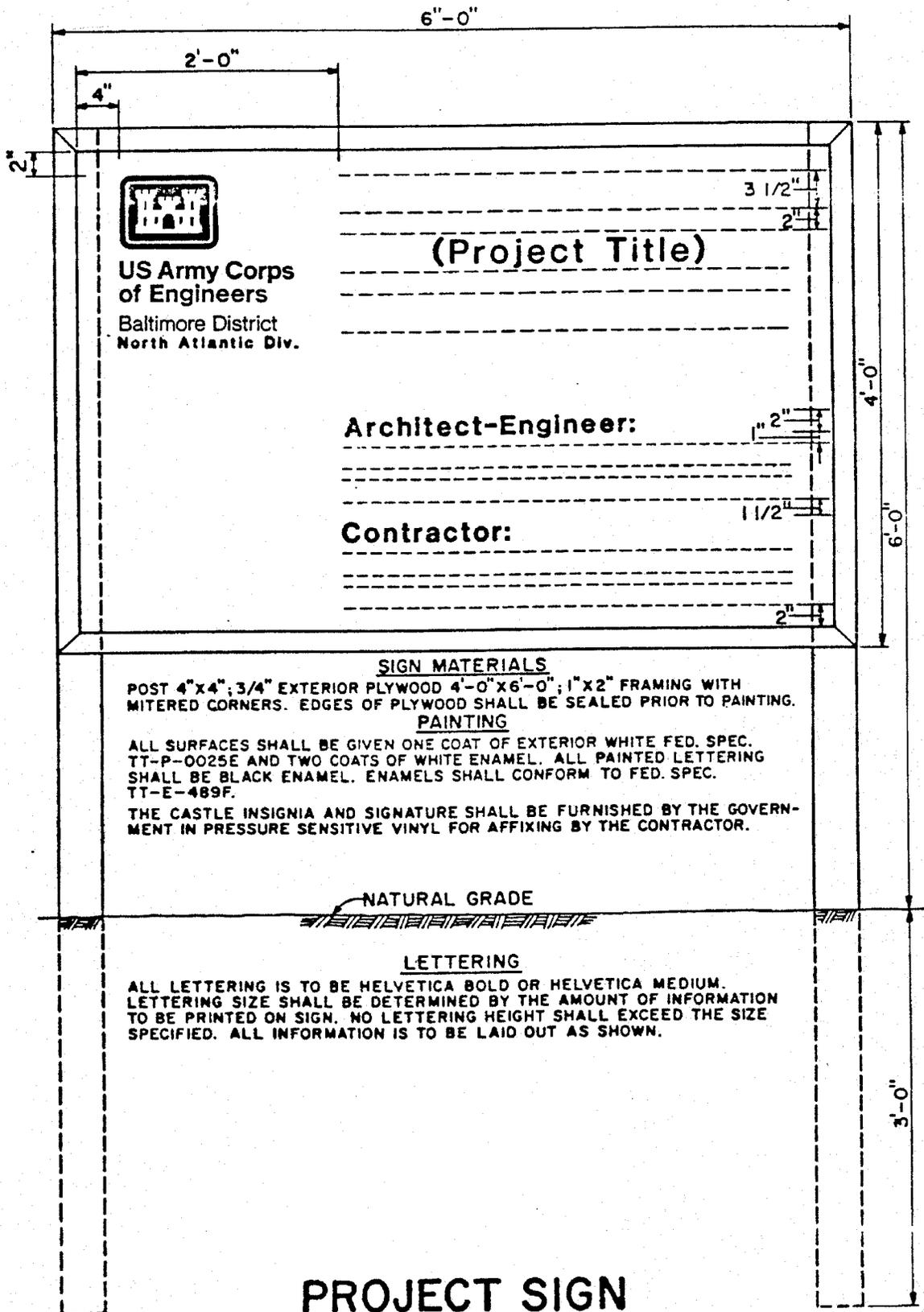
PART 3 EXECUTION
NOT APPLICABLE

ATTACHMENTS:

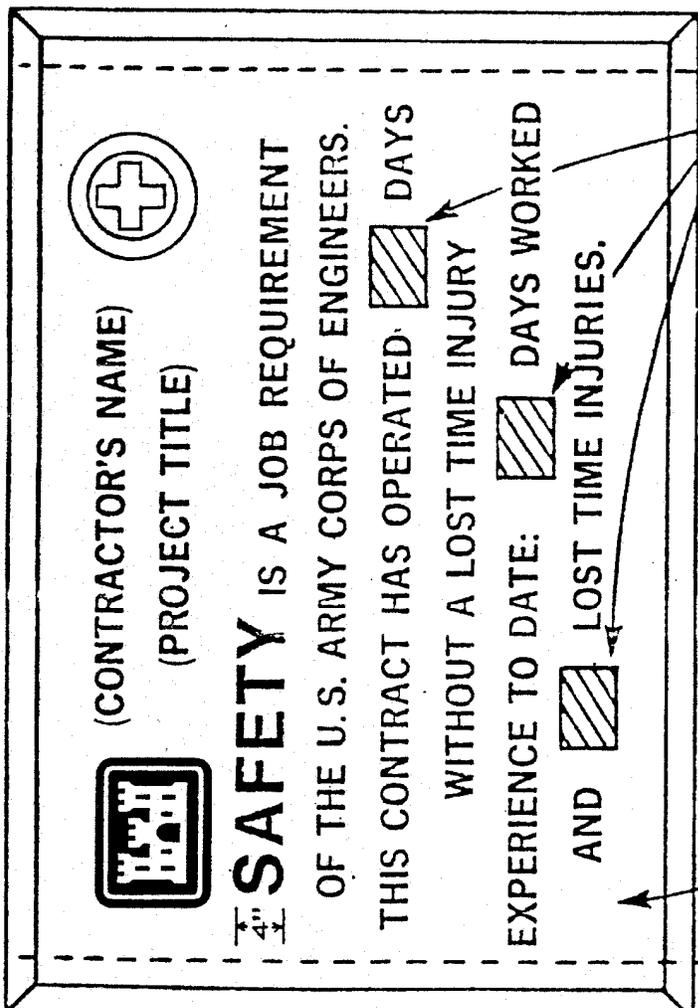
Attachment 1 Project Sign

Attachment 2 Safety Sign

-- End of Section --



6'-0"



3/4" EXTERIOR PLYWOOD 4" x 6" PAINTED BLACK

GRADE

4" x 4" POST

	LETTER HGT	STROKE
CONTRACTORS NAME	4"	3/16"
PROJECT TITLE	3"	3/16"
"SAFETY"	4"	1/2"
REMAINING STATEMENT	2 1/2"	1/4"

SAFETY SIGN

SIGN MATERIALS

POST 4"x4"; 3/4" EXTERIOR PLYWOOD 4'-0"x6'-0", 2"x2" FRAMING WITH MITERED CORNERS. FRAMING ENCLOSED EDGES OF PLYWOOD AND BE INSTALLED FLUSH ON BACK SIDE AND PROJECTING IN FRONT. OUTSIDE WHITE, HOUSE PAINT-2 COATS; BOTH SIDES AND EDGES; COLORS IN OIL FOR LETTERING - LAMP BLACK AND BULLETIN RED; CASTLE SHALL BE RED; LETTERING SHALL BE BLACK; THE CROSS SHALL BE GREEN

THE CASTLE INSIGNIA SHALL BE FURNISHED BY THE GOVERNMENT IN PRESSURE SENSITIVE VINYL FOR AFFIXING BY THE CONTRACTOR.

SECTION 01520

MAINTENANCE OF PUMPING STATION OPERATIONS DURING CONSTRUCTION

03/01

PART 1 GENERAL

1.1 DESCRIPTION

The existing pumping station will be maintained in continuous operation during the entire construction period as specified herein. The intent of this section is to outline the minimum requirements necessary to maintain continuous pumping for continuous customer supply throughout the construction period. The term "WA" refers to the "Contracting Officer."

Work under this Contract shall be scheduled and conducted by the CONTRACTOR so as not to impede any supply process, reduce the quality of pumping station discharge or cause other nuisance. In performing the work indicated and specified, the CONTRACTOR shall plan and schedule his work to meet WA pumping operating requirements, constraints and construction requirements as outlined in this Section.

The CONTRACTOR shall be responsible for coordinating the general construction and electrical, mechanical, instrumentation, plumbing and other disciplines' construction schedules to ensure that any temporary requirements for maintaining the operation of all facilities that are required to be on line at any given time are met at no additional costs to WA.

The CONTRACTOR has the option of providing additional temporary facilities that can eliminate a constraint provided it is done without additional cost to WA and provided that all requirements of these Specifications, are fulfilled. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

A preliminary valve construction-sequencing outline is provided as an attachment to this specification section. This valve construction-sequencing outline is not intended to dictate to the CONTRACTOR his sequencing or means and methods for proceeding with the project. This valve construction-sequencing outline is for the CONTRACTOR's information only.

1.2 SUBMITTALS

SD-01 Preconstruction Submittals

Construction Sequence Plan; G WA

The CONTRACTOR shall submit for approval a Construction Sequence Plan meeting the operational constraints detailed herein. The Construction Sequence Plan shall be coordinated with the approved construction CPM schedule. This submittal shall include the following:

- a. Detailed plan showing all on-line and off-line pumps, open/close valves for each valve replacement phase.

- b. Anticipated duration for each shut-down phase.
- c. Detailed plan for handling water leakage during each shutdown phase, including proper water disposal methods. If line stoppage devices, such as steel-plates or other such devices are to be use, provide detailed vendor information and other pertinent information for detailing each proposed installation and usage.
- d. Drainage/Leakage Water Dechlorination Plan.

1.3 GENERAL CONSTRAINTS

The CONTRACTOR shall schedule all work so that the pumping station is maintained in continuous operation throughout the construction period except during approved shutdowns. All system shutdowns, complete or partial, shall be approved by WA, and as outlined in the Contractor's approved Construction Sequence Plan. The Contractor shall request final approval of scheduled shutdowns at least 14 days in advance of the proposed date. Maximum Shutdown Time, as permitted in the approved Construction Sequence Plan, shall mean the maximum time permitted to elapse between the Contractor being informed by the Contracting Officer that he may start removing a pipe fitting or valve to the time that it is possible for WA to start filling the pipe to place it back into service.

If in the judgment of WA, a requested shutdown is not required for the CONTRACTOR to perform the work, the CONTRACTOR shall utilize approved alternative methods to accomplish the work. All shutdowns shall be coordinated with and scheduled at times approved by WA. The scheduling and duration of tie-ins and connections that require process interruptions or removal of pumps and/or discharge headers from service, or are dependent on process operations, performance requirements, flow of water, or weather as related to flow rate, shall be coordinated with and approved by WA based on field conditions and consideration of the above listed factors.

The optional Work shall adhere to the constraints of Section 01520.

All night work premiums, overtime and other costs related to the scheduling of process interruptions shall be borne by the CONTRACTOR. WA reserves the right to cancel scheduled shutdowns, if conditions warrant. Delays to the CONTRACTOR caused by cancellations will be considered in evaluating requests for time extension only. No additional compensation to the CONTRACTOR shall be considered.

Shutdowns shall not begin until all required materials are on hand and ready for installation. All preparatory work shall be completed prior to the start of a shutdown.

Each shutdown period shall commence at a time approved by WA. The CONTRACTOR shall proceed with 7, 4, and 3-day shutdowns working a minimum 8 hours each day. The CONTRACTOR shall work until the job is completed and normal pumping operations are restored. For 48-hour shutdowns the CONTRACTOR shall work on a 24 hours per day basis until the work is completed. If the CONTRACTOR completes all required Work before the specified shutdown period has ended, WA may immediately place the affected pumping service area back into service.

Shutdowns shall be fully coordinated with WA, and WA personnel shall operate WA facilities involved in the shutdowns.

Any temporary work, facilities, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the CONTRACTOR'S work limits to maintain continuous and dependable pumping station operation shall be furnished, installed, and maintained by the CONTRACTOR at the direction of WA at no extra cost to WA.

The CONTRACTOR may use the WA pumping station crane when performing the Work. In the event of damage to the crane the CONTRACTOR shall immediately make all repairs or replacements to restore the pumping station crane operation to the satisfaction of WA.

WA shall have the authority to order work stopped or prohibit work that would, in WA's opinion, result in unreasonably interrupting pumping station operations.

If the CONTRACTOR impairs the performance or operation of the pumping station as a result of not complying with specified provisions for maintaining pumping station operations, then the CONTRACTOR shall immediately make all repairs or replacements and do all work necessary to restore the pumping station to operation to the satisfaction of WA. Such work shall progress continuously to completion on 24 hours per day, seven-work days per week basis.

The CONTRACTOR shall provide the services of emergency repair crews on call 24 hours a day at no cost to WA.

1.4 GENERAL OPERATING REQUIREMENTS, CONSTRAINTS, AND CONSTRUCTION REQUIREMENTS

1.4.1 Pumping Station Traffic:

Access to the facility for all required operational and maintenance activities by the WA's personnel must be maintained.

1.4.2 Personnel Access:

Personnel Access: WA personnel shall have access to all areas that remain in operation throughout the construction period. The CONTRACTOR shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as to maintain WA personnel access to areas in operation. Access and adequate parking areas for pumping station personnel must be maintained throughout construction. Temporary chain link fencing or equivalent barrier shall be maintained around the periphery of all excavations, trenches and other hazardous areas to preclude inadvertent access by treatment pumping station personnel.

1.4.3 Electrical Demolition Work:

Electrical Demolition Work: Prior to any electrical demolition work, the CONTRACTOR shall demonstrate to the WA that all associated electrical conductors, cables, fiber optic/ communication cables, have been disconnected and made harmless; and that all temporary and / or permanent replacement services have been provided. Any ductbanks, manholes, piping or other structures encountered which are not indicated on the Contract Drawings shall be left intact until such time as a determination is made by the WA as to the necessary disposition of the item.

1.4.4 Power, Light and Communications Systems:

Electric power, lighting service and communications systems shall be maintained in uninterrupted operation in all areas. Individual units may be disconnected as required for replacement, but service shall be available at all times including periods when certain pumping station utilities are out of service. The CONTRACTOR shall coordinate shutdowns required in order to minimize the total number of shutdowns necessary to complete construction. WA's phone service to the pumping station shall be maintained in continuous operation during construction.

1.4.5 Leakage:

The CONTRACTOR must assume that ALL valves within the pumping station will leak. WA has tested various valve replacement scenarios and the CONTRACTOR must assume that water leakage through shut valves may be anywhere from 0 gpm to over 1,000 gpm. The Construction Sequence Plan must detail the CONTRACTOR's method for controlling and properly discharging this water to the Pump Station Drain Conduit.

1.4.6 Draining Pipes, Pumps and Conduits:

The water (including leakage) within all pipes, pumps and conduits to be removed, demolished, replaced or relocated (or dewatered for a specific purpose) shall be transferred to the station drain conduit in a manner approved by the WA through temporary hoses or piping, or by using pumps if hydraulic conditions so require them. The CONTRACTOR shall provide the pumps, piping, and hoses at no additional cost to the WA. No uncontrolled spillage of water from a pipe, pump, or conduit shall be permitted. Any spillage, shall be immediately contained, cleaned up and properly disposed of.

1.4.7 Dechlorination:

Dechlorination: For all outages, the Contractor shall be responsible for primary dechlorination of water discharged to drain. Dechlorination shall be accomplished as follows or by another acceptable method proposed by the Contractor submitted to and approved by WA. The Contractor shall provide, set-up and maintain throughout each outage, a chemical metering station to include a metering pump and sufficient chemical to dechlorinate the flow. Chemical feed shall be calculated based on flow and chlorine residual and may be adjusted manually as outage progresses. For all outages flow may initially be assumed to be 1000 gpm with a chlorine residual of 3.5 gpm. Chemical to be used may include sodium thiosulfate, sodium bisulfate, ascorbic acid or other approved chemical.

1.5 SPECIFIC CONSTRAINTS AS DETAILED BELOW:

1.5.1 Maintenance of Pumping System and Operation:

The pumping system for each service area must be maintained on-line as required during construction. The CONTRACTOR's approved Construction Sequence Plan shall meet the following service area requirements during a given shutdown:

All pump shutdowns must be conducted during the low demand season for the Washington Aqueduct Service Area (November 1 through March 15) with the exception of cone valve work. Work to replace cone valves only affecting the operation of a single pump will be permitted during the entire year, if

operational conditions allow.

Two (2) third high service area pumps and one (1) third high discharge main may be taken off-line with four (4) third high pumps remaining on-line during a 4-day shutdown. The other third high discharge main must remain on-line at all times during the 4-day shutdown. This applies specifically to the replacement of Butterfly Valves 66 and 65.

Two (2) third high service area pumps and one (1) third discharge main may be taken off-line with four (4) third high pumps remaining on-line during a 48-hour shutdown. The other third high discharge main must remain on-line at all times during the 48-hour shutdown. All second high service area pumps and the discharge main may be taken off-line for the 48-hour shutdown.

All second high service area pumps and the second high discharge main may be taken off-line for a 4-day shutdown. In addition one first high service area discharge main may be taken off line for this 4-day shutdown.

One (1) first high service area pump and one (1) first high discharge main may be taken off line with two (2) first high pumps remaining on-line during a 7-day shutdown. The other first high discharge main must remain on-line at all times during the 7-day shutdown.

One (1) first high service area pump and one (1) first high discharge main may be taken off line with two (2) first high pumps remaining on-line during this 48-hour shutdown. The other first high discharge main must remain on-line at all times during the 48-hour shutdown. All low service area pumps and the low service area discharge main may be taken off-line for this 48-hour shutdown.

One (1) first high service area discharge main may be taken off line with three (3) first high pumps remaining on-line during a 4-day shutdown. The other first high discharge main must remain on-line at all times during this 4-day shutdown.

For the Cone/Rotary Valve Replacement Work the affected pump, suction valve and the subsequent discharge main butterfly valves in each flow direct shall be take off-line for this 7-day shutdown.

For the Optional Phase Work, two (2) third high service area pumps may be taken off-line with four (4) third high pumps remaining on-line during a 48-hour shutdown.

Another Optional Phase shutdown consists of all second high service area pumps and the second high discharge main may be taken off-line for a 7-day shutdown.

For the Optional Pump Suction Valve Replacement, one suction conduit, the affected pump cone/rotary discharge valve shall be taken off-line for a 3-day shutdown. There shall be 15 separate 3-day shutdowns, one for each pump suction valve replacement.

1.6 SCHEDULE IMPACTS

It is anticipated that schedule limitations will dictate that outages required to perform all work specified will require two winter seasons. No claim for additional compensation for delay will be accepted for work scheduled and completed within the contract performance period.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

ATTACHMENTS

1. Dalecarlia Pumping Station - Valve Construction Sequence Plan
2. Dalecarlia Pumping Station - Optional Valve Construction Sequence Plan

DALECARLIA PUMPING STATION-VALVE CONSTRUCTION SEQUENCE PLAN

PHASE	VALVE	THIRD HIGH OPERATIONS	SECOND HIGH OPERATIONS	FIRST HIGH OPERATIONS	LOW SERVICE OPERATIONS	MAXIMUM SHUTDOWN TIME
1	BV-66	CLOSE BV: 19, 20, 58, 60, 61, 64 PUMPS ON: 10, 11, 12, 13 PUMPS OFF: 14, 15 CLOSE YARD VALVE	NORMAL	NORMAL	NORMAL	4 DAYS
2a	BV-65	CLOSE BV: 17, 18, 57, 59, 60, 62, PUMPS ON: 12, 13, 14, 15 PUMPS OFF: 10, 11, CLOSE YARD VALVE	CLOSE RV 67, 69, 70	NORMAL	NORMAL	4 DAYS
2b	RV-70	CLOSE BV: 17, 18, 57, 59, 60, 62, PUMPS ON: 12, 13, 14, 15 PUMPS OFF: 10, 11 CLOSE YARD VALVE	SHUT DOWN ALL PUMPS CLOSE BV: 13, 14, 15, 52, 53, 54, 55, 56 CLOSE RV: 67, 69 CLOSE YARD VALVE	PUMPS ON: 4, 5, 6 CLOSE BV: 43, 45, 48	NORMAL	48 HOURS
2c	RV-67	NORMAL	SHUT DOWN ALL PUMPS CLOSE BV: 13, 14, 15, 52, 53, 54, 55, 56 CLOSE YARD VALVE	PUMPS ON: 4, 5, 6 CLOSE BV: 43, 45, 48, 50	NORMAL	4 DAYS
2c	RV-69	NORMAL	SHUT DOWN ALL PUMPS CLOSE BV: 13, 14, 15, 52, 53, 54, 55, 56 CLOSE YARD VALVE	PUMPS ON: 4, 5, 6 CLOSE BV: 43, 45, 48, 50	NORMAL	4 DAYS
3	BV-48	NORMAL	NORMAL	PUMP OFF: 6 PUMPS ON: 4, 5 CLOSE BV: 10, 43, 45, 46, 50, 71 CLOSE RV: 69 CLOSE YARD VALVE*	NORMAL	7 DAYS
4a	RV-68	NORMAL	NORMAL	PUMPS OFF: 4 PUMP ON: 5, 6 CLOSE BV: 12, 42, 44, 46, 47, 49,	SHUT DOWN ALL PUMPS CLOSE BV: 7, 8, 9, 37, 38, 39, 40, 41	48 HOURS
4b	PV-24	NORMAL	NORMAL	NORMAL	PUMP OFF: 1 PUMPS ON: 2, 3 CLOSE BV: 9 38, 40	7 DAYS
4c	PV-27	NORMAL	NORMAL	PUMPS OFF: 4 PUMP ON: 5, 6 CLOSE BV: 12, 44, 46	NORMAL	7 DAYS
5a	PV-23	NORMAL	NORMAL	NORMAL	PUMPS OFF: 2 PUMPS ON: 1, 3 CLOSE BV: 8, 37, 39	7 DAYS
5b	PV-26	NORMAL	NORMAL	PUMP OFF: 5 PUMPS ON: 4, 6 CLOSE BV: 11, 42, 43	NORMAL	7 DAYS
5c	PV-29	NORMAL	PUMPS OFF: 8 PUMPS ON: 7, 9 CLOSE BV: 14, 52, 53	NORMAL	NORMAL	7 DAYS

DALECARLIA PUMPING STATION-VALVE CONSTRUCTION SEQUENCE PLAN

PHASE	VALVE	THIRD HIGH OPERATIONS	SECOND HIGH OPERATIONS	FIRST HIGH OPERATIONS	LOW SERVICE OPERATIONS	MAXIMUM SHUTDOWN TIME
5d	PV-35	PUMPS ON: 10, 11, 12, 13, 15 PUMPS OFF: 14 CLOSE BV: 20, 60, 61	NORMAL	NORMAL	NORMAL	7 DAYS
6a	PV-22	NORMAL	NORMAL	NORMAL	PUMPS OFF: 3 PUMPS ON: 1, 2 CLOSE BV: 7, 39, 40	7 DAYS
6b	PV-25	NORMAL	NORMAL	PUMP OFF: 6 PUMPS ON: 4, 5 CLOSE BV: 10, 45, 46	NORMAL	7 DAYS
6c	PV-34	PUMPS ON: 10, 11, 12, 13, 14 PUMPS OFF: 15 CLOSE BV: 19, 58, 64	NORMAL	NORMAL	NORMAL	7 DAYS
7	BV-47	NORMAL	NORMAL	CLOSE BV: 42, 44, 49 CLOSE YARD VALVES	NORMAL	4 DAYS
8	PV-31	PUMPS ON: 10, 11, 13, 14, 15 PUMPS OFF: 12 CLOSE BV: 16, 62, 63	NORMAL	NORMAL	NORMAL	7 DAYS

OPTIONAL DALECARLIA PUMPING STATION-VALVE CONSTRUCTION SEQUENCE PLAN

PHASE	VALVE	THIRD HIGH OPERATIONS	SECOND HIGH OPERATIONS	FIRST HIGH OPERATIONS	LOW SERVICE OPERATIONS	MAXIMUM SHUTDOWN TIME
1	BV-63	PUMPS ON: 10, 11, 14, 15 PUMPS OFF: 12, 13 CLOSE BV: 16, 21, 62, 64	NORMAL	NORMAL	NORMAL	48 HOURS
2	BV-60	PUMPS ON: 10, 12, 13, 15 PUMPS OFF: 11, 14 CLOSE BV: 17, 20, 59, 61	NORMAL	NORMAL	NORMAL	48 HOURS
3a	BV-56	NORMAL	ALL PUMPS OFF CLOSE BV: 13, 14, 15, 52, 53 54, 55 CLOSE 67, 69 CLOSE YARD VALVE	NORMAL	NORMAL	7 DAYS
3b	BV-41	NORMAL	NORMAL	NORMAL	ALL PUMPS OFF CLOSE BV: 7, 8, 9, 37, 38, 39, 40 CLOSE YARD VALVE	7 DAYS
4	BV-19	PUMPS ON: 10, 11, 13, 14 PUMPS OFF: 12, 15 CLOSE BV: 1, 4, 16 CLOSE PV: 31, 34	PUMPS ON: 7, 8 PUMP OFF: 9 CLOSE BV: 13 CLOSE PV: 28	PUMPS ON: 4, 5 PUMP OFF: 6 CLOSE BV: 10 CLOSE PV: 25	PUMPS ON: 1, 2 PUMP OFF: 3 CLOSE BV: 7 CLOSE PV: 22	3 DAYS
4	BV-16	PUMPS ON: 10, 11, 13, 14 PUMPS OFF: 12, 15 CLOSE BV: 1, 4, 19 CLOSE PV: 31, 34	PUMPS ON: 7, 8 PUMP OFF: 9 CLOSE BV: 13 CLOSE PV: 28	PUMPS ON: 4, 5 PUMP OFF: 6 CLOSE BV: 10 CLOSE PV: 25	PUMPS ON: 1, 2 PUMP OFF: 3 CLOSE BV: 7 CLOSE PV: 22	3 DAYS
4	BV-13	PUMPS ON: 10, 11, 13, 14 PUMPS OFF: 12, 15 CLOSE BV: 16, 19 CLOSE PV: 31, 34	PUMPS ON: 7, 8 PUMP OFF: 9 CLOSE BV: 1, 4 CLOSE PV: 28	PUMPS ON: 4, 5 PUMP OFF: 6 CLOSE BV: 10 CLOSE PV: 25	PUMPS ON: 1, 2 PUMP OFF: 3 CLOSE BV: 7 CLOSE PV: 22	3 DAYS
4	BV-10	PUMPS ON: 10, 11, 13, 14 PUMPS OFF: 12, 15 CLOSE BV: 16, 19 CLOSE PV: 31, 34	PUMPS ON: 7, 8 PUMP OFF: 9 CLOSE BV: 13 CLOSE PV: 28	PUMPS ON: 4, 5 PUMP OFF: 6 CLOSE BV: 1, 4 CLOSE PV: 25	PUMPS ON: 1, 2 PUMP OFF: 3 CLOSE BV: 7 CLOSE PV: 22	3 DAYS
4	BV-7	PUMPS ON: 10, 11, 13, 14 PUMPS OFF: 12, 15 CLOSE BV: 16, 19 CLOSE PV: 31, 34	PUMPS ON: 7, 8 PUMP OFF: 9 CLOSE BV: 13 CLOSE PV: 28	PUMPS ON: 4, 5 PUMP OFF: 6 CLOSE BV: 10 CLOSE PV: 25	PUMPS ON: 1, 2 PUMP OFF: 3 CLOSE BV: 1, 4, CLOSE PV: 22	3 DAYS
5	BV-20	PUMPS ON: 10, 12, 13, 15 PUMPS OFF: 11, 14 CLOSE BV: 2, 5, 17 CLOSE PV: 32, 35	PUMPS ON: 7, 9 PUMP OFF: 8 CLOSE BV: 14 CLOSE PV: 29	PUMPS ON: 4, 6 PUMP OFF: 5 CLOSE BV: 11 CLOSE PV: 26	PUMPS ON: 1, 3 PUMP OFF: 2 CLOSE BV: 8 CLOSE PV: 23	3 DAYS
5	BV-17	PUMPS ON: 10, 12, 13, 15 PUMPS OFF: 11, 14 CLOSE BV: 2, 5, 20 CLOSE PV: 32, 35	PUMPS ON: 7, 9 PUMP OFF: 8 CLOSE BV: 14 CLOSE PV: 29	PUMPS ON: 4, 6 PUMP OFF: 5 CLOSE BV: 11 CLOSE PV: 26	PUMPS ON: 1, 3 PUMP OFF: 2 CLOSE BV: 8 CLOSE PV: 23	3 DAYS
5	BV-14	PUMPS ON: 10, 12, 13, 15 PUMPS OFF: 11, 14 CLOSE BV: 17, 20 CLOSE PV: 32, 35	PUMPS ON: 7, 9 PUMP OFF: 8 CLOSE BV: 2, 5 CLOSE PV: 29	PUMPS ON: 4, 6 PUMP OFF: 5 CLOSE BV: 11 CLOSE PV: 26	PUMPS ON: 1, 3 PUMP OFF: 2 CLOSE BV: 8 CLOSE PV: 23	3 DAYS

OPTIONAL DALECARLIA PUMPING STATION-VALVE CONSTRUCTION SEQUENCE PLAN

PHASE	VALVE	THIRD HIGH OPERATIONS	SECOND HIGH OPERATIONS	FIRST HIGH OPERATIONS	LOW SERVICE OPERATIONS	MAXIMUM SHUTDOWN TIME
5	BV-11	PUMPS ON: 10, 12, 13, 15 PUMPS OFF: 11, 14 CLOSE BV: 17, 20 CLOSE PV: 32, 35	PUMPS ON: 7, 9 PUMP OFF: 8 CLOSE BV: 14 CLOSE PV: 29	PUMPS ON: 4, 6 PUMP OFF: 5 CLOSE BV: 2, 5 CLOSE PV: 26	PUMPS ON: 1, 3 PUMP OFF: 2 CLOSE BV: 8 CLOSE PV: 23	3 DAYS
5	BV-8	PUMPS ON: 10, 12, 13, 15 PUMPS OFF: 11, 14 CLOSE BV: 17, 20 CLOSE PV: 32, 35	PUMPS ON: 7, 9 PUMP OFF: 8 CLOSE BV: 14 CLOSE PV: 29	PUMPS ON: 4, 6 PUMP OFF: 5 CLOSE BV: 11 CLOSE PV: 26	PUMPS ON: 1, 3 PUMP OFF: 2 CLOSE BV: 2, 5 CLOSE PV: 23	3 DAYS
6	BV-21	PUMPS ON: 11, 12, 14, 15 PUMPS OFF: 10, 13 CLOSE BV: 3, 6, 18 CLOSE PV: 33, 36	PUMPS ON: 8, 9 PUMP OFF: 7 CLOSE BV: 15 CLOSE PV: 30	PUMPS ON: 5, 6 PUMP OFF: 4 CLOSE BV: 12 CLOSE PV: 27	PUMPS ON: 2, 3 PUMP OFF: 1 CLOSE BV: 9 CLOSE PV: 24	3 DAYS
6	BV-18	PUMPS ON: 11, 12, 14, 15 PUMPS OFF: 10, 13 CLOSE BV: 3, 6, 21 CLOSE PV: 33, 36	PUMPS ON: 8, 9 PUMP OFF: 7 CLOSE BV: 15 CLOSE PV: 30	PUMPS ON: 5, 6 PUMP OFF: 4 CLOSE BV: 12 CLOSE PV: 27	PUMPS ON: 2, 3 PUMP OFF: 1 CLOSE BV: 9 CLOSE PV: 24	3 DAYS
6	BV-15	PUMPS ON: 11, 12, 14, 15 PUMPS OFF: 10, 13 CLOSE BV: 18, 21 CLOSE PV: 33, 36	PUMPS ON: 8, 9 PUMP OFF: 7 CLOSE BV: 3, 6 CLOSE PV: 30	PUMPS ON: 5, 6 PUMP OFF: 4 CLOSE BV: 12 CLOSE PV: 27	PUMPS ON: 2, 3 PUMP OFF: 1 CLOSE BV: 9 CLOSE PV: 24	3 DAYS
6	BV-12	PUMPS ON: 11, 12, 14, 15 PUMPS OFF: 10, 13 CLOSE BV: 18, 21 CLOSE PV: 33, 36	PUMPS ON: 8, 9 PUMP OFF: 7 CLOSE BV: 15 CLOSE PV: 30	PUMPS ON: 5, 6 PUMP OFF: 4 CLOSE BV: 3, 6 CLOSE PV: 27	PUMPS ON: 2, 3 PUMP OFF: 1 CLOSE BV: 9 CLOSE PV: 24	3 DAYS
6	BV-9	PUMPS ON: 11, 12, 14, 15 PUMPS OFF: 10, 13 CLOSE BV: 18, 21 CLOSE PV: 33, 36	PUMPS ON: 8, 9 PUMP OFF: 7 CLOSE BV: 15 CLOSE PV: 30	PUMPS ON: 5, 6 PUMP OFF: 4 CLOSE BV: 12 CLOSE PV: 27	PUMPS ON: 2, 3 PUMP OFF: 1 CLOSE BV: 3, 6 CLOSE PV: 24	3 DAYS

SECTION 01561

ENVIRONMENTAL PROTECTION
01/01

PART 1 GENERAL

The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution during, and as the result of, construction operations under this contract except for those measures set forth in the Technical Provisions of these specifications. For the purpose of this specification, environmental pollution 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 or affect other species of importance to man. The control of environmental pollution requires consideration of air, water, and land.

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-01 Preconstruction Submittals

Facility Plan; G WA

Location of storage and service facilities

Temporary Plan; G WA

Temporary excavation and embankments

1.2 APPLICABLE REGULATIONS

The Contractor and his subcontractors in the performance of this contract, shall comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement in effect on the date of this solicitation, as well as the specific requirements stated elsewhere in the contract specifications.

1.3 NOTIFICATION

The Contracting Officer will notify the Contractor of any non-compliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. 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 time lost due to any such stop order shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.4 SUBCONTRACTORS

Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

1.5 PROTECTION OF WATER RESOURCES

The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acid construction wastes or other harmful materials. All work under this contract shall be performed in such a manner that objectionable conditions will not be created in streams through or adjacent to the project areas.

1.6 EROSION AND SEDIMENTATION CONTROL

The Contractor shall accomplish the erosion and sedimentation control in accordance with the contract drawings.

1.7 BURNING

Burning will be allowed only if permitted in other sections of the specifications or authorized in writing by the Contracting Officer. The specific time, location and manner of burning shall be subject to the approval of the Contracting Officer. Fires shall be confined to a closed vessel, guarded at all times and shall be under constant surveillance until they have burned out or have been extinguished. All burning shall be so thorough that the materials will be reduced to ashes.

1.8 DUST CONTROL

The Contractor shall maintain all work area free from dust which would contribute to air pollution. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment or similar methods will be permitted to control dust. Sprinkling, where used, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

1.9 PROTECTION OF LAND RESOURCES

1.9.1 General

It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, the Contractor shall confine his construction activities to areas defined by the plans and specifications or to be cleared for other operations. The following additional requirements are intended to supplement and clarify the requirements of the CONTRACT CLAUSES:

1.9.2 Protection of trees retained

1.9.2.1 Contractors Responsibility

The Contractor shall be responsible for the protection of the tops, trunks and roots of all existing trees that are to be retained on the site. Protection shall be maintained until all work in the vicinity has been completed and shall not be removed without the consent of the Contracting Officer. If the Contracting Officer finds that the protective devices are insufficient, additional protection devices shall be installed.

1.9.2.2 Stockpiling

Heavy equipment, vehicular traffic, or stockpiling of any materials shall not be permitted within the drip line of trees to be retained.

1.9.2.3 Storage

No toxic materials shall be stored within 100 feet (30.5 m) from the drip line of trees to be retained.

1.9.2.4 Confined Area

Except for areas shown on the plans to be cleared, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without special authority. Existing near by trees shall not be used for anchorage unless specifically authorized by the Contracting Officer. Where such special emergency use is permitted, the Contractor shall first adequately protect the trunk with a sufficient thickness of burlap over which softwood cleats shall be tied.

1.9.2.5 Tree Defacing

No protective devices, signs, utility boxes or other objects shall be nailed to trees to be retained on the site.

1.9.3 Restoration of Landscape Damage

Any trees or other landscape feature scarred or damaged by the Contractor's operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Contracting Officer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of. All scars made on trees, designated on the plans to remain, and all cuts for the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted. Where tree climbing is necessary, the use of climbing spurs will not be permitted. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Contracting Officer, shall be immediately removed and replaced with a nursery-grown tree of the same species. Replacement trees shall measure no less than 2 inches in diameter at 6 inches above the ground level.

1.9.4 Location of Storage and Services Facilities

The location on Government property of the Contractor's storage and service facilities, required temporarily in the performance of the work, shall be upon cleared portions of the job site or areas to be cleared. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. A facility plan showing storage and service facilities shall be submitted for approval to the Contracting Officer. Where buildings or platforms are constructed on slopes, the Contracting Officer may require cribbing to be used to obtain level foundations. Benching or leveling of earth may not be allowed, depending on the location of the proposed facility.

1.9.5 Temporary Excavation and Embankment

If the Contractor proposes to construct temporary roads, embankments or excavations for plant and/or work areas, he shall submit a temporary plan for approval prior to scheduled start of such temporary work.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01572

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

07/00

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.2 MANAGEMENT

The Contractor shall take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste, consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling shall accrue to the Contractor. Firms and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

1.3 PLAN

A waste management plan shall be submitted within 15 days after contract award 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, reuse, or recycling. 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.

-- End of Section --

SECTION 01720

AS-BUILT DRAWINGS - CADD
01/01

PART 1 GENERAL

1.1 Preparation

This section covers the preparation of as-built drawings complete, as a requirement of this contract. The terms "drawings," "contract drawings," "drawing files," and "final as-built drawings" refer to a set of computer-aided design and drafting (CADD) contract drawings in electronic file format which are to be used for as-built drawings.

1.2 PROGRESS MARKED UP AS-BUILT PRINTS

The Contractor shall revise one set of paper prints to show the as-built conditions during the prosecution of the project. These as-built marked prints shall be kept current and available on the jobsite at all times. All 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. The as-built marked prints will be jointly reviewed for accuracy and completeness by the Contracting Officer and a responsible representative of the construction Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the 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 and will continue the monthly deduction of the 10% retainage even after 50% completion of the contract. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and a representative of the Contractor regarding the accuracy and completeness of updated drawings. The prints shall show the following information, but not be limited thereto:

1.2.1 Location and Description

The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.

1.2.2 Location and Dimensions

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

1.2.3 Corrections

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

Correct elevations if changes were made in site grading.

1.2.4 Changes

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.

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

All changes or modifications which result from the final inspection.

1.2.5 Options

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

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-11 Closeout Submittals

Progress Prints; G WA

Preparation of two copies of as-builts from the Contractor to the Contracting Officer for review and approval.

Final Requirements; G WA

CADD Files

Shall consist of two sets of completed as-built contract drawings on separate media consisting of both CADD files (compatible with the Using Agency/Sponsor's system on electronic storage media identical to that supplied by the Government) and a CALS Type 1, Group 4, Raster Image File of each contract drawing.

Receipt by the Contractor of the approved marked as-built prints.

1.4 PRELIMINARY SUBMITTAL

At the time of final inspection, the Contractor shall prepare two copies of the progress prints, (as-builts) and these shall be delivered to the Contracting Officer for review and approval. These as-built marked prints shall be neat, legible and accurate. The review by Government personnel will be expedited to the maximum extent possible. Upon approval, one copy of the as-built marked prints will be returned to the Contractor for use in preparation of final as-built drawings. If upon review, the as-built marked prints are found to contain errors and/or omissions, they shall be returned to the Contractor for corrections. The Contractor shall complete the corrections and return the as-built marked prints to the Contracting Officer within ten (10) calendar days.

1.5 DRAWING PREPARATION

1.5.1 As-Built Drawings Approval

Upon approval of the as-built prints submitted, the Contractor will be furnished by the Government one set of contract drawings, with all amendments incorporated, to be used for as-built drawings. These contract drawings will be furnished on CD-ROM. These drawings shall be modified as may be necessary to correctly show all the features of the project as it has been constructed by bringing the contract set into agreement with the approved as-built prints, adding such additional drawings as may be necessary. These drawings are part of the permanent records of this project and the Contractor shall be responsible for the protection and safety thereof until 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.

1.5.2 Proficient Personnel

Only personnel proficient in the preparation of engineering CADD drawings to standards satisfactory and acceptable to the Government shall be employed to modify the contract drawings or prepare additional new drawings. All additions and corrections to the contract drawings shall be equal in quality to that of the originals. Line work, line weights, lettering, layering conventions, and symbols shall be the same as the original line work, 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 as-built drawings shall be identical to that used on the contract drawings. All additions and corrections to the contract drawings shall be accomplished using CADD media files supplied by the Government. These contract drawings will already be compatible with the Using Agency/Sponsor's system when received by the Contractor. The Using Agency/Sponsor uses AutoCAD Release 2000 CADD software system. The media files will be supplied on ISO 9660 Format CD-ROM. The Contractor is responsible for providing all program files and hardware necessary to prepare as-built drawings. The Contracting Officer will review all as-built drawings for accuracy and the Contractor shall make all required corrections, changes, additions, and deletions.

1.5.3 Final Revisions

When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the General 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. All original contract drawings shall be dated in the revision block (SEE ATTACHMENT 1 at the end of this section - while the title block sample attachments do not depict the contract drawings' title blocks, the sample revision blocks above these attachments are to be used as guidance in completing the actual contract drawings' revision blocks.)

1.6 FINAL REQUIREMENTS

After receipt by the Contractor of the approved marked as-built prints and the original contract drawing files the Contractor will, within 30 days for contracts less than \$5 million or 60 days for contracts \$5 million and above, make the final as-built submittal. The submittal shall consist of

the following:

a) Two sets of the as-built contract drawings on separate CD's (ISO 9660 Format CD-ROM) consisting of the updated CADD files and a CALS Type 1 Group 4 Raster Image File of each contract drawing plate. The CALS files shall be exact duplicates of the full sized plots of the completed as-built contract drawings at a resolution of 400 dpi and may be either plotted to CALS files directly from the CADD files, or scanned to file from the prints.

b) Two sets of full size paper prints (plots) of the completed as-built contract drawings.

c) The return of the approved marked 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 translations 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 its CADD system. All paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit as-built drawing files and marked prints as required herein 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.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01735

TRAINING

PART 1 GENERAL

1.1 PURPOSE

The Contractor's vendor program shall provide WA personnel with sufficient information and skills training on the theory, design, and site specific operation and maintenance practices to insure that equipment and systems can be efficiently and effectively operated and maintained by the trainees upon completion of the training.

1.2 RELATED SECTIONS

13405A	Process Control
13622	Information Historian and Operations
15201	Valves
16751	Closed Circuit Television Systems

1.3 ROLES AND RESPONSIBILITIES

1.3.1 Responsibilities of the Washington Aqueduct

The WA's responsibilities shall include:

providing classrooms suitable for training including necessary tables, chairs, and electrical power supply;

providing field locations for hands-on training;

providing trainees;

scheduling training sessions; and

reviewing lesson plans, training manuals and other instructional aids, instructor evaluations, and course evaluations.

1.3.2 Responsibilities of the Contractor

The Contractor's responsibilities shall include:

Providing qualified instructors for class, field, and hands-on training;

Providing training manuals for all courses; and

Providing all equipment necessary to perform the training.

1.4 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-08 Manufacturer's Instructions

Instructor Qualifications; G WA

Each instructor provided by the Contractor must be qualified to operate and maintain, and to train others in the operation and maintenance of, the equipment or system.

Instructor Qualifications shall be submitted 30 days prior to training.

Training Manuals; G WA

The Contractor shall submit a Training Manual for each curriculum that includes all of the information specified below. The training manual shall include a training strategy portion, which will not be distributed to the trainees. The Training Manual shall provide the instructor a definition of concepts and information that will be taught to each target audience and a description of the methods and materials to be used during the training. The Training Manual shall provide the trainee an organized package of information for use by trainees during the training sessions and as reference material for operation and maintenance in the future. The Contractor shall provide a Training Manual for each trainee and 6 additional Training manuals. The WA shall be permitted to reproduce all material in the training manual for use by its employees.

Each Training Manual shall contain:

Cover Page

Table of Contents

Lesson Plan

Lesson Plan Cover Page

Lesson Plan Summary

Lesson Plan with a training outline;

Training Strategy and a copy of all training aids (distributed to Instructors and COR or his/her designee(s) only); and

A copy of trainee materials (handouts, reference materials etc)

Training manuals shall be submitted within 30 days of shop drawing approval and at least 30 days prior to training.

1.4.1 Instructor Qualifications

Each instructor provided by the Contractor must be qualified to operate and maintain, and to train others in the operation and maintenance of, the equipment or system on which he or she will conduct training as evidenced by the following:

1. The proposed instructor's name;
2. His/her experience related to the operation and maintenance of the equipment or system for which training is to be provided;
3. The type of experience or expertise (i.e., operation, installation, design, service, etc.);

4. Previous training and/or instructional experience; and

5. The names, agency or company affiliations, and telephone numbers of at least two references who have knowledge of the instructor's training and/or instructional experience.

1.5 SCHEDULE

The number of people and number of sessions are provided in the table at the end of this specification section. The WA shall develop a schedule for training to ensure that all appropriate personnel receive training. Maximum duration of any on-site class shall be four (4) hours and the maximum number of classes for any trainee in any day shall be one. Each course shall be offered three times to ensure that all appropriate personnel have an opportunity to attend. A course can be given to approximately ten people from 7 am to 11 am and to another ten people from 11 am to 3 pm on the same day. A make-up session for that same course shall be offered at a later date to accommodate personnel not who were not available to attend the first two sessions. The Contractor shall receive notification at least seven (7) days prior to any scheduled training in the event that the training will have to be rescheduled.

1.6 CONTENT

1.6.1 Maintenance Sessions

The content and focus of these sessions shall be targeted for maintenance personnel.

1.6.1.1 Metal seated butterfly valves and hydraulically operated pump check valves. The Training Manual shall include::

1. A description of the equipment and its auxiliary/ support systems including nomenclature, function, and theory of operation;
2. Safety requirements for maintenance of the equipment and its auxiliary/support systems that includes suggested safety equipment and practices. The safety requirements shall include, but not be limited to, local and remote lockout procedures, safe procedures for handling alarms, and built-in safety devices for preventive and corrective maintenance; and
3. An explanation of pre-start-up, routine operation monitoring, and shutdown procedures, including automatic and manual modes, where applicable.
4. Preventive maintenance procedures to be followed including, but not limited to, parts, lube quantities, types, frequencies, application points, time requirements to perform procedures;
5. Specific procedures regarding adjustment requirements for alignment, wear, calibration, etc. for all preventive maintenance and corrective maintenance procedures,
6. Special tools, techniques or procedures required for either preventive or corrective maintenance of the equipment and auxiliary/support systems;
7. Assembly/disassembly procedures required for preventive or

corrective maintenance taught through the use of models, "exploded" views, parts lists, hands-on field training, and audio visual materials, including the time required to perform the procedures; and

8. Maintenance troubleshooting of equipment and auxiliary/support systems.

1.6.1.2 Base Instrument Training

For each new instrument, this training session should include installation, maintenance and service. The Training Manual shall include:

1. Description of the physical layout of each piece of hardware;
2. Instructions for how to perform calibration procedures;
3. Instructions for preventive maintenance procedures and schedules;
4. Diagnostic procedures, guidance for troubleshooting, and repair instructions; and
5. Instructions for maintenance of input devices.

1.6.1.3 Process Control System

The Training Manual shall include:

1. Description of the general hardware architecture and functionality of the system;
2. Explanations of the functional operation of the system, including workstations; operator commands; application programs, control sequences, and control loops;

1.6.1.4 Closed Circuit Television Systems

The Training Manual shall include the following:

1. Description of the general CCTV hardware, installed system architecture and configuration;
2. Description of the functional operation of the installed system and software;
3. Procedures for fault diagnostics and correction;
4. Procedures for general system maintenance; and

5. Procedures for replacement of failed components and integration of replacement components into the operating CCTV system.

1.6.2 Operations Sessions

The content and focus of these sessions shall be targeted for operations personnel.

1.6.2.1 Metal seated butterfly valves and hydraulically operated pump check valves.

The Training Manual shall include:

1. A description of the equipment and its auxiliary/ support systems including nomenclature, function, and theory of operation;
2. Safety requirements for use of the equipment and its auxiliary/support systems that includes suggested safety equipment and practices. The safety requirements shall include, but not be limited to, local and remote lockout procedures, safe procedures for handling alarms, and built-in safety devices for preventive and corrective maintenance; and
3. An explanation of pre-start-up, routine operation monitoring, and shutdown procedures, including automatic and manual modes, where applicable.
4. Maintenance troubleshooting of equipment and auxiliary/support systems.

1.6.2.2 Process Control Systems

The Training Manual shall include:

1. Description of the general hardware architecture and functionality of the system;
2. Explanations of the functional operation of the system, including workstations; operator commands; application programs, control sequences, and control loops;
3. Procedures for database entry and modification;
4. Procedures for generating reports and alarm reporting; and
5. Guidance on performing diagnostics and accessing historical files

1.6.2.3 Data Historian Overview

The Training Manual shall include the following:

1. Description of the functional characteristics of the major hardware and software system components.
2. Procedures for data entry and retrieval;

3. Procedures for producing reports;
4. Procedures for tracking, managing and acknowledging alarms;
and
5. Discussion of delegation of tasks to appropriate personnel
for successful use and necessary maintenance.

1.6.2.4 Closed Circuit Television Systems

The Training Manual shall include the following:

1. Description of the general CCTV hardware, installed system
architecture and configuration;
2. Description of the functional operation of the installed
system and software;
3. Instructions for using operator commands;
4. Procedures for recognizing and responding to alarms; and
5. Procedures for acknowledging and generating alarm reports;

1.6.3 Historian Database Administration

Up to four (4) people should receive intense training in all aspects of the historian software. Two of these people should have the operation and maintenance of computers as their primary function for the WA while the other two should have plant operations as their primary function. These four people shall attend two full days of training off-site.

The Training Manual shall include the following:

1. Thorough description of system architecture, hardware and
software;
2. Identification of system diagnostics and instructions for
troubleshooting all system components;
3. Instructions for repair and replacement procedures;
4. Instructions for Procedures for establishing access
restrictions;
5. Procedures for examining and reporting audit system data;
6. Procedures for maintaining and troubleshooting data interface
between the historian and other WA software and hardware;
7. Procedures for maintaining the historian servers and
associated hardware;

8. Procedures for setting compression, archive, and step features and explanations for appropriate use of these functions with specific data collected at the WA facilities.
9. Procedures for setting default values and expected ranges for values;
10. Procedures for setting significant digits and other means of presenting and manipulating a data point;
11. Procedures for programming routine calculations and performing trending analyses;
12. Procedures for creating custom manual data entry screens;
13. Procedures for reviewing and validating data;
14. Procedures for use of graphical interface software and instructions on how to access ODBC data sources; and
15. Procedures for use of process batch interface and process manager capabilities.
16. An overview of presenting data as batches;
17. Procedures for use of process batch interface;
18. Procedures for use of process manager capabilities;

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

Table 1. Training Outline

Course	# of unique sessions/# of times each session is offered/hrs per session	Total number of attendees
Maintenance Sessions		
Metal Seated Butterfly Valve	1 course/3 times/4 hrs each	30
Cone Valves	1 course/3 times/4 hrs each	30
Base Instruments	1 course per instrument type/3 times/2 hrs each	10
Process Control System	1 course/3 times/4 hrs each	30
CCTV	1 Course/3 times/4 hrs each	30
Operations Sessions		
Metal Seated Butterfly Valve	1 course/3 times/2 hrs each	30
Cone Valves	1 course/3 times/2 hrs each	30
Process Control System	1 course/3 times/4 hrs each	30
CCTV	1 course/3 times/4 hrs each	30
Data Historian Overview	1 course/3 times/4 hrs each	30
Historian Database Administration	2 full days of off-site training	4

-- End of Section --

SECTION 02220

DEMOLITION

05/02

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 the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6 (1990) Safety Requirements for Demolition Operations

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

40 CFR 61-SUBPART M National Emission Standard for Asbestos

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (1996) U.S. Army Corps of Engineers 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 inside or outside the buildings. 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 (in accordance with Section 01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT, if applicable; salvaged items and materials shall be disposed of as specified.

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

Work Plan; G WA

The procedures proposed for the accomplishment of the work. The

procedures shall provide for safe conduct of the work, including procedures and methods to provide necessary supports, lateral bracing and shoring when required, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1.

SD-07 Certificates

Demolition plan; G WA

Notifications; G WA

Notification of Demolition and Renovation forms; G WA

Submit proposed salvage, demolition and removal procedures to the Contracting Officer for approval before work is started.

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

Furnish timely notification of demolition and renovation projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61-SUBPART M. Notify the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M.

Complete and submit Notification of Demolition and Renovation forms to Federal and State authorities and Contracting Officer, postmarked or delivered at least ten working days prior to commencement of work, in accordance with 40 CFR 61-SUBPART M. Copy of form is attached at end of this section.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

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 structural elements and 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 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas so as to ensure effectiveness and to prevent displacement.

1.6.4 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 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.

1.6.5 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, or 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.

1.6.6 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 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.

1.9 Required Data

Demolition plan (Work plan) shall include procedures for coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Include statements affirming Contractor inspection of the existing roof deck and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work.

1.10 Environmental Protection

The work shall comply with the requirements of Section 01561 ENVIRONMENTAL PROTECTION.

1.11 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Utilities and Related Equipment

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. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. If utility lines are encountered that are not shown on drawings, contact the Contracting Officer for further instructions.

3.1.2 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs including aggregate base. Provide neat sawcuts at limits of pavement removal as indicated.

3.1.3 Masonry

Sawcut and remove masonry so as to prevent damage to surfaces to remain and

to facilitate the installation of new work. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as specified for the new work.

3.1.4 Concrete

Saw concrete along straight lines. 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 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.
- b. Where existing partitions have been removed leaving damaged or missing resilient tile flooring, patch to match the existing floor tile.
- c. Patch acoustic lay-in ceiling where partitions have been removed. The transition between the different ceiling heights shall be effected by continuing the higher ceiling level over to the first runner on the lower ceiling and closing the vertical opening with a painted sheet metal strip.

3.2 DISPOSITION OF MATERIAL

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 to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage area on-site as directed by the Contracting Officer.

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.

3.3 CLEANUP

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.

3.3.1 Debris and Rubbish

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.

-- End of Section --

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

Nonsaleable Materials

Written permission to dispose of such products on private property shall be filed with the Contracting Officer.

SD-04 Samples

Tree wound paint; G WA

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.

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.

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. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. 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 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, 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.

-- End of Section --

SECTION 02316A

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS
05/02

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1556	(1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R1996e1) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.2 DEGREE OF COMPACTION

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557.

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-06 Test Reports

Field Density Tests; G WA
Testing of Backfill Materials; G WA

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 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.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 3 inches. The Contracting Officer shall be notified of any contaminated materials.

2.1.3 Cohesionless and Cohesive Materials

Cohesionless materials shall include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials shall include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM shall be identified as cohesionless only when the fines are nonplastic.

2.1.4 Rock

Rock shall consist of boulders measuring 1/2 cubic yard or more and materials that cannot be removed without systematic drilling and blasting such as rock material in ledges, bedded deposits, unstratified masses and conglomerate deposits, and below ground concrete or masonry structures, exceeding 1/2 cubic yard in volume, except that pavements shall not be considered as rock.

2.1.5 Unyielding Material

Unyielding material shall consist of rock and gravelly soils with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

2.1.6 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

2.1.7 Select Granular Material

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a No. 200 mesh sieve and no less than 95 percent by weight passing the 1 inch sieve. The maximum allowable aggregate size shall be 3 inches, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

2.1.8 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 3 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 3 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

2.2 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of lengthwise and crosswise. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in TABLE 1 and shall bear a continuous printed inscription describing the specific utility.

TABLE 1. Tape Color

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone, Telegraph, Television, Police, and Fire Communications
Blue:	Water Systems
Green:	Sewer Systems

2.3 Detection Wire For Non-Metallic Piping

Detection wire shall be insulated single strand, solid copper with a minimum diameter of 12 AWG.

PART 3 EXECUTION

3.1 EXCAVATION

Excavation shall be performed to the lines and grades indicated. Rock excavation shall include removal and disposition of material defined as rock in paragraph MATERIALS. Earth excavation shall include removal and disposal of material not classified as rock excavation. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than 2 feet. Excavated material not required or not satisfactory for backfill shall be removed from the site. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating shall be removed to maintain the stability of the bottom and sides of the excavation. Unauthorized overexcavation shall be backfilled in accordance with paragraph BACKFILLING AND COMPACTION at no additional cost to the Government.

3.1.1 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 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. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.1.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.1.1.2 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.

3.1.1.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.1.1.4 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. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.1.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.1.2 Stockpiles

Stockpiles of satisfactory and unsatisfactory and wasted materials 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 at no additional cost to the Government.

3.2 BACKFILLING AND COMPACTION

Backfill material shall consist of satisfactory material, select granular material, or initial backfill material as required. Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for cohesionless soils and 90 percent maximum density for cohesive soils, unless otherwise specified.

The Contractor may reuse excavated materials as backfill so long as the material meets the requirements of satisfactory material.

3.2.1 Trench Backfill

Trenches shall be backfilled to the grade shown, to match adjacent grades.

3.2.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.2.1.2 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.

3.2.1.3 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. 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. This requirement shall also apply to all other areas not specifically designated above.

3.2.2 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.

3.3 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.3.1 Electrical Distribution System

Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.

3.3.2 Plastic Marking Tape

Warning tapes shall be installed directly above the pipe, at a depth of 18 inches below finished grade unless otherwise shown.

3.4 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.4.1 Testing Facilities

Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved by the Contracting Officer.

3.4.2 Testing of Backfill Materials

Classification of backfill materials shall be determined in accordance with ASTM D 2487 and the moisture-density relations of soils shall be determined in accordance with ASTM D 1557. A minimum of one soil classification and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3.4.3 Field Density Tests

Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. Field density shall be performed as directed by the Contracting Officer. One moisture density relationship shall be determined for every 1500 cubic yards of material used. Field in-place density shall be determined in accordance with ASTM D 1556 ASTM D 2167 ASTM

D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using the sand cone method as described in paragraph Calibration of the ASTM publication. 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. 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, at intervals as directed by the Contracting Officer. Copies of calibration curves, results of calibration tests, and field and laboratory density tests shall be furnished to the Contracting Officer. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

-- End of Section --

SECTION 02921A

SEEDING
11/02

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 2028	(1976; R 1997) Cutback Asphalt (Rapid-Curing Type)
ASTM D 4972	(1995a) pH of Soils
ASTM D 5268	(1992; R 1996) Topsoil Used for Landscaping Purposes
ASTM D 977	(1998) Emulsified Asphalt

U.S. DEPARTMENT OF AGRICULTURE (USDA)

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

Equipment

A listing of equipment to be used for the seeding operation.

Delivery; G WA

Delivery schedule.

Finished Grade and Topsoil; G WA

Finished grade status.

Topsoil; G WA

Availability of topsoil from the stripping and stock piling

operation and delivered topsoil.

Soil Amendments; G WA

Product data on all soil amendment to be used.

Mulch; G WA

Product data on mulch to be used.

Asphalt Adhesive; G WA

Product data on asphalt adhesiver to be used.

Surface Erosion Control Material; G WA

Product dta on surface erosion control material to be used.

Quantity Check; G WA

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed.

Seed Establishment Period; G WA

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 WA

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants.

Application of Pesticide; G WA

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-06 Test Reports

Equipment Calibration

Soil Test; G WA

SD-07 Certificates

Seed; G WA

pH Adjuster; G WA

Fertilizer; G WA

Pesticide; G WA

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:

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

b. pH Adjuster. Calcium carbonate equivalent and sieve analysis.

c. Fertilizer. Chemical analysis and composition percent.

d. Pesticide. EPA registration number and registered uses.

1.3 SOURCE INSPECTION

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 Topsoil

Prior to the delivery of any topsoil, its availability shall be verified in paragraph TOPSOIL. A soil test shall be provided for topsoil delivered to the site.

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 Pesticides

Pesticide material 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.

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. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. 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. Material shall be stored according to manufacturer's instructions and not with seeding operation materials.

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-approved 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 AMS Seed Act and applicable state seed laws.

2.1.2 Temporary Seed

Temporary seed shall be grass which will not compete with the grasses sown later for permanent cover shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover.

2.1.3 Permanent Seed Species and Mixtures

Permanent seed species and mixtures shall be proportioned by weight as follows:

<u>Common Name</u>	<u>Mixture Percent by Weight</u>	<u>Percent Pure Live Seed</u>
Kentucky Bluegrass	20%	85%
Merion Kentucky Bluegrass	20%	85%
Red Chewings Fescue	45%	85%
Manhattan Rye	15%	90%

Seed mixtures shall not contain millet or any other large-seed producing grass.

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 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite. 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 seed 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 shall not be used.

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, sulfur, 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

Fertilizer shall be controlled release commercial grade, free flowing, 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 Nitrogen Carrier Fertilizer

Nitrogen carrier fertilizer shall be commercial grade, free flowing, and uniform in composition. The fertilizer may be a liquid nitrogen solution. As recommended by the soil test.

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 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.

2.5 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.

2.6 WATER

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

2.7 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.

2.8 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.8.1 Surface Erosion Control 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 Fabric

Fabric shall be knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall have a minimum life of 6 months.

2.8.3 Surface Erosion Control Net

Net shall be heavy, twisted jute mesh, weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

2.8.4 Surface Erosion Control Chemicals

Chemicals shall be high-polymer synthetic resin or cold-water emulsion of selected petroleum resins.

2.8.5 Hydrophilic Colloids

Hydrophilic colloids shall be physiologically harmless to plant and animal life without phytotoxic agents. Colloids shall be naturally occurring, silicate powder based, and shall form a water insoluble membrane after curing. Colloids shall resist mold growth.

2.8.6 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 April 1 to May 15 for spring establishment; from August 1 to October 1 for fall establishment.

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.

3.1.3 Equipment Calibration

Immediately prior to the commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.

3.1.4 Soil Test

Delivered topsoil, existing soil in smooth graded areas, 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 on site 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 seed species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, 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 Fertilizer

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. As recommended by the soil test.

3.2.2.2 Applying Soil Conditioner

The soil conditioner shall be spread uniformly over the soil a minimum 1 inch depth and thoroughly incorporated by tillage into the soil to a maximum 4 inch depth. As recommended by the soil test.

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. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner 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 Lawn Area Debris

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

3.2.4.3 Field Area Debris

Debris and stones over a minimum 3 inch 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 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.

3.3.1.1 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 Mulching

3.3.2.1 Hay or Straw Mulch

Hay or straw mulch shall be spread uniformly at the rate of 2 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.

3.3.2.2 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.

3.3.2.3 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.

3.3.2.4 Non-Asphaltic Tackifier

Hydrophilic colloid shall be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture shall be applied over the area.

3.3.2.5 Asphalt Adhesive Coated Mulch

Hay or straw mulch may be spread simultaneously with asphalt adhesive applied at a rate between 10 to 13 gallons per 1000 square feet, using power mulch equipment which shall be equipped with suitable asphalt pump and nozzle. The adhesive-coated mulch shall be applied evenly over the surface. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.2.6 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

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

3.3.3 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

Temporary seeding shall be done when directed, when a quick cover is required to prevent surface erosion and/or when a disturbed area is not worked for 7 consecutive days. The areas designated shall be seeded in accordance with temporary seed species listed under Paragraph SEED. Temporary seeding is required if an area is ready for final seed but requirements of paragraph 3.1 can not be met. These areas shall be final seeded when conditions permit.

3.4.2.1 Soil Amendments

When soil amendments have not been applied to the area, the quantity of 1/2 of the required soil amendments shall be applied and the area tilled in accordance with paragraph SITE PREPARATION. The area shall be watered in accordance with paragraph Watering Seed.

3.4.2.2 Remaining Soil Amendments

The remaining soil amendments shall be applied in accordance with the paragraph Tillage when the surface is prepared for installing seed.

3.5 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.6 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.

3.6.1 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.

3.6.2 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. A pesticide plan shall be submitted.

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 Commencement

The seed establishment period to obtain a healthy stand of grass plants shall begin on the first day of seeding work under this contract and shall continue through the remaining life of the contract and end 6 months after the last day of the seeding operation required by this contract. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.9.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health when the grass plants are a minimum 1 inch high.

3.9.2.1 Lawn Area

A satisfactory stand of grass plants from the seeding operation for a lawn area shall be a minimum 100 grass plants per square foot. Bare spots shall be a maximum 6 inches square. The total bare spots shall be a maximum 2 percent of the total seeded area.

3.9.2.2 Field Area

A satisfactory stand of grass plants from the seeding operation for a field area shall be a minimum 100 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total seeded area.

3.9.3 Maintenance During Establishment Period

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

3.9.3.1 Post-Fertilization

A maximum 1/2 pound per 1000 square feet of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants. As recommended by the soil test.

3.9.3.2 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

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 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance

work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

-- End of Section --

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES

The following items to be painted were identified as having lead based paint (LBP) over the 0.5% by weight limit and will require some form of LBP abatement. Refer to Specification Section 13281.

Piping as identified in Specification 09900 and shown on the Drawings, Valves and piping as indicated to be painted on the drawins.

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 CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENITS (ACGIH)

ACGIH Limit Values (1991-1992) Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A13.1 Scheme for Identification of Piping Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 235 Standard Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)

ASTM D 4214 Standard Test Method for Evaluating Degree of Chalking of Exterior Paint Films

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000 Air Contaminants

FEDERAL STANDARDS (FED-STD)

FED-STD-313 (Rev. C) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

MASTER PAINTERS INSTITUTE (MPI)

MPI 77 (2001) Epoxy Cold Cured, Gloss

MPI 101 (2001) Cold Curing Epoxy Primer

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP01-01 (2001) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC QP 1 (1989) Evaluating Qualifications of Painting Contractors (Field Application to Complex Structures)

SSPC PA 1 (2000) Shop, Field, and Maintenance Painting

SSPC Guide 3 (1995) Safety in Paint Application

SSPC VIS 1 (1989) Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)

SSPC VIS 3 (1993) Visual Standard for Power- and Hand-Tool Cleaned Steel (Standard Reference Photographs)

SSPC VIS 4 (2001) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

SSPC SP 1 (1982) Solvent Cleaning

SSPC SP 2 (1995) Hand Tool Cleaning

SSPC SP 3 (1995) Power Tool Cleaning

SSPC SP 6 (1994) Commercial Blast Cleaning

SSPC SP 7 (1994) Brush-Off Blast Cleaning

SSPC SP 10 (1994) Near-White Blast Cleaning

SSPC SP 12 (1995) Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultra high-Pressure Water Jetting Prior to Recoating

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:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on

a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP01-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Piping identification

Submit color stencil codes

SD-03 Product Data

Coating; G AE

Manufacturer's Technical Data Sheets

SD-04 Samples

Color; G WA

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, pot life, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings: G WA

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual and include the following:

- a. Name of individual and proposed position for this work.
- b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.3.2 SSPC QP 1 Certification

All contractors and subcontractors that perform surface preparation or coating application shall be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of SSPC QP 1 prior to contract award, and shall remain certified while accomplishing any surface preparation or coating application. The painting contractors and painting subcontractors must remain so certified for the duration of the project. If a contractor's or subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in contractor certification status.

1.4 REGULATORY REQUIREMENTS

1.4.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.4.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.4.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.4.4 Asbestos Content

Materials shall not contain asbestos.

1.4.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.4.6 Silica

Abrasive blast media shall not contain free crystalline silica.

1.4.7 Human Carcinogens

Materials shall not contain ACGIH Limit Values and ACGIH Limit Values confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.5 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F.

1.6 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525, "Safety Requirements" and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC Guide 3.

1.6.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable manufacturer's Material Safety Data Sheets (MSDS)

or local regulation.

- b. 29 CFR 1910.1000.
- c. ACGIH Limit Values, threshold limit values.
- d. Contractors attention is directed to Specification Section 13281 for Lead Hazard Control Activities.

1.7 ENVIRONMENTAL CONDITIONS

1.7.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than 5 degrees F above dew point;
- b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.8 PIPE, VALVE/EQUIPMENT IDENTIFICATION AND COLOR CODING:

Provide identification of pipes, valves, pumps, tanks and similar vessels by color as specified in the Pipe Identification Schedule and with name of contents, directional flow arrows and other required legend, as scheduled.

- a. Use stenciled letters and arrows or self-adhesive labels or tapes located at intervals no greater than 20 ft. apart on straight runs. Mark each valve, branch, wye change in direction and each side of floor and wall penetrations.
 - 1. Labels or tapes shall be moisture and U.V. resistant.
- b. Provide legend of size, character and location conforming to ANSI A13.1 for stenciled letters or labels.

<u>Pipe Identification Schedule</u>	<u>Color</u>	<u>TNEMEC Company No.</u>
Finished Water - Low Service	Blue	Safety Blue SC06
Finished Water - First High Service	Red	Safety Red SC09
Finished Water - Second High Service	Green	Safety Green SC07
Finished Water - Third High Service	Yellow/Orange	Bright Yellow SC02
Plant Water	Dark Blue	Indigo PL10

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

1.9 LOCATION AND SURFACE TYPE TO BE PAINTED

1.9.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

- a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
- b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- c. Existing coated surfaces that are damaged during performance of the work.

1.9.1.1 Interior Painting

Includes new surfaces, existing uncoated surfaces, and existing coated surfaces of the piping, valves and appurtenances as indicated and existing coated surfaces made bare by cleaning operations.

1.9.2 Mechanical

Includes field coating of interior new and existing surfaces.

- a. Where a pipe or valve is indicated to be painted, include the following items unless indicated otherwise.

- (1) Supports and hangers

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Refer to Specification Section 13281, Lead Hazard Control Activities.

Remove dirt, loose particles, grease, oil, disintegrated coatings, and other foreign matter and substances deleterious to coating performance as

specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

- a. Wipe previously painted surfaces to receive solvent-based coatings clean with a clean, dry cloth saturated with mineral spirits, ASTM D 235. Allow surface to dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.
- b. The requirements specified are minimum. Comply also with the application instructions of the paint manufacturer.
- c. Previously painted surfaces damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.
- d. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.
- e. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8.
- f. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.
- g. Edges of chipped paint shall be feather edged and sanded smooth.
- h. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.
- i. New, proposed coatings shall be compatible with existing coatings.

3.2.2 Existing Coated Surfaces with Minor Defects

Sand, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings. Remove chalking by sanding so that when tested in accordance with ASTM D 4214, the chalk rating is not less than 8.

3.2.3 Removal of Existing Coatings

Remove existing coatings from the following surfaces:

- a. Surfaces containing large areas of minor defects;
- b. Surfaces containing more than 20 percent peeling area; and
- c. Surfaces designated by the Contracting Officer, such as surfaces where rust shows through existing coatings.

3.2.4 Substrate Repair

- a. Repair substrate surface damaged during coating removal;
- b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and
- c. Clean and prime the substrate as specified.

3.3 PREPARATION OF METAL SURFACES

3.3.1 Existing and New Ferrous Surfaces

Ferrous Surface Preparation

SSPC Blasting/Cleaning Levels^a - Primer Types/Exposures

	Exposure ^b		
	Mild	Moderate	Severe ^c
Surface Condition			
Uncoated			
Oil, grease, dirt	SP 1	for all moderate conditions, select from "mild" or "severe" for	SP 10, SP 12 WJ2 or SP 5 SP 12 WJ1
Localized corrosion - mill scale, rust	SP 2, SP 3, or SP 7 SP 12 WJ-4	intended performance level	AS ABOVE
Extensive deterioration	SP 6 ^d SP 12 WJ-3		AS ABOVE
Shop coated			
Oil, grease, dirt	e		AS ABOVE
Localized damage to be spot repaired	SP 2, SP 3, or SP 7, SP 12 WJ-4		AS ABOVE
Extensive deterioration	SP 6 ^d , SP 12 WJ-3		AS ABOVE
Existing coating			

Oil, grease	e	e	SP 1
Chalking, foreign matter other than oil or grease, localized deterioration	f		g
Extensive deterioration	SP 6 ^d ,	SP 12 WJ-3	SP 10, SP 12 WJ2 or SP 5 SP 12 WJ1

^a If it is not possible to abrasive blast or use water jetting, SP 11 is recommended. It is considered equivalent to SP 6. SP 11 is also preferred wherever SP 2 or SP 3 are shown in the Table.

^b These are minimum requirements. A high-performing system may be a better choice for longer performance.

^c Use water jetting to SP 12 WJ-3, as alternate to SP 6 degree of cleanliness.

^d Use only the steam clean, or non-alkaline detergent solutions of SP 1.

^e First, remove chalk and dirt with a non-alkaline detergent solution, and follow with power wash at minimum 2000 psi. Second, spot clean, in order of preference by SP 6, SP 11, SP 7, SP 3, or SP 2.

^f First, remove chalk and dirt with a non-alkaline detergent solution, and follow with power wash at minimum 2000 psi. Second, spot clean, in order of preference, by SP 10, SP 6, or SP 11.

^g SSPC SP 12 provides four levels of water jetting cleanliness and they reflect the four levels of abrasive blast cleanliness but direct correlation is inaccurate or inappropriate. The four levels are (best to worst): WJ-1, WJ-2, WJ-3, and WJ-4. They are equivalent to the abrasive blast standards SSPC SP 5, SP 10, SP 6, and SP 7. The standard also includes three levels of cleanliness for nonvisual contaminants, SC-1, SC-2, and SC-3. The preferred level of cleanliness is between SC-1 or SC-2.

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6, or brush-off blast remaining surface in accordance with SSPC SP 7; Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.
- b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with .

3.3.2 Final Ferrous Surface Condition:

Type Coating	Level of Cleaning, SSPC SP ...
a. High Performance (i.e. Epoxy, Urethane, others)	7,10

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7, SSPC SP 6, and SSPC SP 10. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4.

3.4 APPLICATION

3.4.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats.

3.4.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when

thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.4.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.5 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

3.6 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with ANSI A13.1. Place stenciling in clearly visible locations. On piping not covered by ANSI A13.1, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

3.7 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.8 PAINT TABLES

All DFT's are minimum values.

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

- A. Metal, including valves, conduit, hangers, supports, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. Epoxy MPI INT 5.1L-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 101	MPI 77	MPI 77

INTERIOR STEEL / FERROUS SURFACES
System DFT: 5.25 mils

131 microns

-- End of Section --

SECTION 13281

LEAD HAZARD CONTROL ACTIVITIES

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 Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 1553 (1993) Practice for Collection of Airborne Particulate Lead During Abatement and Construction Activities

CODE OF FEDERAL REGULATIONS (CFR)

24 CFR 35 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

40 CFR 745 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (1996; TIA 96-1, 96-2) Methods of Fire Test for Flame-Resistant Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 84-100 (1984; Supple 1985, 1987, 1988 & 1990) NIOSH Manual of Analytical Methods

U.S ARMY CORPS OF ENGINEERS ENGINEERING MANUAL (EM)

EM 385-1-1 (1996) Safety and Health Requirements Manual

1.2 DEFINITIONS

a. Lead Hazard Control Activity - Any construction work where a worker may be occupationally exposed to lead and procedures have to be followed to assure that: 1). Lead inside the lead hazard control area is cleaned up to appropriate levels and 2). Lead dust does not disperse outside the lead hazard control area at unacceptable levels.

b. Competent Person - As defined by 29 CFR 1926.62 and 29 CFR 1910.XXX means a person who is capable of identifying and predicting lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them. The Competent Person shall:

1. Verify that training meets applicable requirements.
2. Review and approve LBP Management Plan for conformance to the applicable referenced standards.
3. Inspect LBP removal work for conformance with the accepted LBP Management Plan.
4. Ensure that worker exposure air monitoring activities are in accordance with 29 CFR 1926.62.
5. Ensure work is performed in strict accordance with specifications.
6. Ensure hazardous exposure to personnel and to the environment are adequately controlled.
7. Directing air monitoring.

c. Industrial Building - Any building used for industrial purposes where normal operations inside the building may produce lead aerosol that will settle out on inside surfaces.

1.3 DESCRIPTION OF WORK

The following items were identified as having lead based paint (LBP) over the 0.5% by weight limit and will require some form of LBP abatement as specified in this section:

Piping as identified in Specification 09900.
Valves and piping as indicated to be painted on the drawings.

The Contractor shall:

a. Construct an enclosure or establish a control area, before commencement of LBP removal. Enclosure specifications are outlined in section 3.1.2.

b. Remove all chipping, loose, peeling paint on the following items. Prepare intact LBP surfaces in accordance with Section 09900 PAINTS AND COATINGS for additional painting. Repaint these items in accordance with Section 09900 PAINTS AND COATINGS. Items to be partially abated, prepared for painting, and repainted include:

Piping as identified in Specification Section 09900 and shown on the drawings.

Valves and piping to be painted as indicated on the drawings.

c. Clean paint chips up from floor and other areas daily. No dry sweeping allowed.

d. Remove LBP dust by HEPA vacuuming and damp wiping all areas with a Tri-Sodium Phosphate (TSP) solution.

The Contractor and his employees shall be properly trained, certified, and licensed in regard to all lead based paint activities. The Contractor shall obtain all Federal, state and local permits and licenses before commencement of work. The Contractor shall obtain approval of all submittals before commencement of work.

The Contractor shall obtain an independent, Certified Industrial Hygienist (CIH) to monitor for lead levels as required by all applicable regulations.

The Contractor shall verify in this report that surface preparation activities for intact paint will not generate lead levels higher than the regulatory lead levels.

The Contractor shall analyze and dispose of all wastes generated from lead paint activities in accordance with all applicable EPA, DOT and OSHA regulations.

1.3.1 Protection of Existing Areas To Remain

All project work including, but not limited to, lead hazard work, storage, transportation, and disposal shall be performed without damaging or contaminating adjacent work, drinking water sources, and adjacent areas. Where such work or areas are damaged or contaminated, the Contractor shall restore work and areas to the original condition at no additional cost to the Government.

1.3.2 Coordination with Other Work

The contractor shall coordinate lead hazard control activities with work being performed in adjacent areas. Coordination procedures shall be explained in the Contractor's Accident Prevention Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead hazard control activities.

1.4 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

Lead Based Paint (LBP) Inventory Statements; G, WA

The Contractor shall review the specified abatement work tasks and abatement methods, and prepare a detailed LBP Management Plan that identifies the work procedures, health, and safety measures to be used.

Materials and Equipment; G, WA
Expendable Supplies; G, WA

A description of the materials, equipment and expendable supplies required; including Material Safety Data Sheets (MSDSs) for material brought onsite to perform the work.

Qualifications; G, WA

A report providing evidence of qualifications and designating responsibilities for personnel and laboratories.

SD-06 Test Reports

Licences, Permits, and Notifications; G, WA
Accident Prevention Plan (APP); G, WA

A report describing how the Contractor will protect workers, building occupants, and building contents while performing lead hazard control activities; and how project clearance will be performed.

Sampling and Analysis; G, WA

A log of the analytical results is required for the sampling. The log shall be kept current.

Clearance Report; G, WA

Report prepared by the QSHP.

1.5 QUALIFICATIONS

1.5.1 Qualifications and Organization Report

The Contractor shall furnish a qualification and organization report. The report shall describe the qualifications of the qualified safety and health professional (QSHP), onsite safety and health supervisor (OSHS), labor staff and the independent risk assessor. The report shall include an organization chart showing the Contractor's personnel by name and title and project specific responsibilities and authorities. The report shall describe the qualifications of the laboratories selected for this project. The report shall be signed by the Contractor and the qualified safety and health professional to indicate that all personnel and laboratories comply with certification and experience requirements of this section and that project personnel have been given the authority to complete the tasks assigned to them. Certification that the Contractor has at least two (2) years prior experience on LBP abatement projects similar in nature and extent to ensure the capability to perform the abatement in a satisfactory manner.

1.5.2 Personnel and Subcontractor Responsibilities and Qualifications

1.5.2.1 Qualified Safety and Health Professional (QSHP)

The QSHP shall be responsible for development of project specific requirements in the Accident Prevention Plan (APP); supervise implementation of the APP requirements; visit the site as needed to verify effectiveness of the APP and to coordinate resolution of unknown situations that may develop as the work progresses; be available to provide consultation to the Onsite Safety and Health Supervisor (OSHS); review sampling and analytical results to evaluate occupational exposure levels, verify effectiveness of controls and determine if clearance requirements have been met. The QSHP shall have demonstrable experience with the implementation of occupational safety and health regulations.

1.5.2.2 Lead Hazard Control Workers

Lead Hazard Control workers shall be responsible for performing the labor necessary to complete the lead hazard control activities required in this contract.

1.5.2.3 Testing Laboratories

The laboratory selected to perform analysis on paint chip, soil or dust wipe samples shall be accredited by EPA's National Lead Laboratory Accreditation Program (NLLAP). The laboratory selected will perform analysis on worker exposure (industrial hygiene) samples shall be in the American Industrial Hygiene Association's Industrial Hygiene Laboratory Accreditation Program (IHLAP) and shall be successfully participating in the Proficiency Analytical Testing (PAT) program for lead. The Contractor shall submit the last three consecutive PAT testing results to the Contracting Officer for review and approval of lab services.

1.5.2.4 Blood Lead Testing

The laboratory selected to perform analysis on worker blood samples shall be approved by OSHA and meet the requirements contained in http://www.osha-slc.gov/OCIS/toc_bloodlead.html.

1.5.2.5 Disposal Facility and Transporter

The Contractor shall furnish written evidence that the landfill to be used is approved for lead disposal by USEPA and state and local requirements and regulations. Copies of any required signed agreements between the Contractor (including subcontractors and transporters) and the lead disposal facility shall be provided.

The Contractor shall segregate, pack, label, mark, placard, manifest, and transport all hazardous wastes and non-hazardous waste according to all applicable OSHA, EPA, and DOT regulations. Copies of all manifests, Bills of Lading, and Certificates of Disposal shall be provided to the Government Representative.

1.5.2.6 Competent Person

Certification that the Contractor's full-time onsite Competent Person meets the competent person requirements 29 CFR 1926.62 and is experienced in administration and supervision of LBP abatement projects similar in extent and nature.

1.6 REGULATORY REQUIREMENTS

In addition to the detailed requirements of this specification, work shall be performed in accordance with requirements of EM 385-1-1 and applicable regulations including, but not limited to 29 CFR 1910, 29 CFR 1926, especially Section .62, and the accepted Accident Prevention Plan with Appendices. Matters of interpretation of the standards shall be resolved to the satisfaction of and with the concurrence of, the Contracting Officer before starting work. Where these requirements vary, the most stringent shall apply. The following State and local statutes, regulations and requirements apply to lead hazard control activities to be performed: State, D.C., Local D.C.

1.7 LBP MANAGEMENT PLAN

The Contractor shall review the Lead Based Paint (LBP) Inventory Statements the specified abatement work tasks and abatement methods, and prepare a detailed LBP Management Plan that identifies the work procedures, health, and safety measures to be used. The plan shall address the various sources of lead, the methods undertaken to abate the lead hazards, and include the following key elements:

a. Location of LBP containing components and a brief description of each work activity that will emit lead in to the work place atmosphere. A description of lead hazards containing lead shall be included and keyed to the project drawings.

b. Description of LBP control methods and procedures for each LBP containing component.

c. Description of product data; equipment and materials.

d. Description of controls, crew size, worker responsibilities, and operating and maintenance procedures.

e. Description of Hazardous Communication Program. Contractor shall provide copies of Material Safety Data Sheets (MSDS) and the approximate quantities of HM brought on-site. Chemicals shall be approved by the Contracting Officer's Representative before bringing on-site.

f. Experience in performing lead abatement work shall include information required in the section QUALIFICATIONS.

g. Training requirements in accordance with all Federal, State, and local regulations for all LBP workers, Certified Industrial Hygienist, Competent Persons, and individuals transporting and handling hazardous waste. Training certificates and licenses shall be provided before commencement of work for all LBP workers, supervisors, competent persons, HW transporters and handlers, and CIHs.

The Contractor shall train all LBP workers in project specific information such as:

1. Specific nature of the operation which could result in exposure to lead.

2. Purpose, proper selection, fitting, use, and limitations of respirators.

3. Purpose and description of the medical surveillance program, the medical removal protection program, the worker's rights to records, and teratogen and mutagen hazards caused by lead exposure.

4. Contents of any company compliance plans in effect.

5. Instruction to use chelating agents only under the direction of a licensed physician and not on a regular basis to remove lead from their bodies.

h. Description of sketch of LBP control areas and decontamination areas.

i. Description of the technologic equipment used to keep occupational exposure below the PEL and minimize worker exposure to lead (i.e., HEPA-filtered vacuum equipment/cleaners, special negative air enclosure equipment and supplied, etc.). Equipment List Data shall include a list of equipment items to be used in the work, including brand name, model, capacity, performance characteristics, quantities and other pertinent information. Contractor shall submit manufacturer certification of Local Exhaust Equipment in accordance with ANSI Z9.2 Requirements. The Contractor shall submit the last three (3) pressure differential recordings.

j. Sequencing of LBP related work.

K. Personnel protective equipment including respiratory protection

program and controls.

l. Engineering controls, containment structures and safety measures.

m. Signage, posted warnings, labels, and notices. This information as further explained in the section, POSTED WARNINGS AND NOTICES, shall be provided and displayed accordingly.

n. Housekeeping procedures used to minimize spread of lead contamination in the lead hazard control area.

o. Hygiene facilities and practices used to prevent workers from inadvertent ingestion of lead. Eating, drinking, smoking and rest room procedures. The Contractor shall describe personal hygiene facilities to be used by the workers as further described in the section , HYGIENE FACILITIES.

p. Medical surveillance practices and procedures to monitor worker exposure to lead and to assure fitness for wearing respiratory protection devices. This shall also include medical removal protection.

q. Worker exposure Assessment including methods and procedures to monitor and document worker exposure to lead. Worker exposure monitoring shall be broken into two parts.

Part A: Monitoring (if performed for the "initial determination" described in 29 CFR 1926.62(d)). Monitoring for the initial determination may be omitted from the plan if the Contractor has sufficient proof from previous operations as specified in 29 CFR 1926.62(d) (3) (iii) and (iv) that workers will not be exposed over the action level. The Contractor shall substitute objective proof of action level compliance in Part A, if "initial determination" monitoring is omitted.

Part B: Continued Exposure Monitoring. Worker exposure monitoring after the initial lead exposure determination has been made. Sampling, and analytical methods to include personal air sampling requirements of 29 CFR 1926.62.

r. Emergency Contingency Plan for major breach of containment barriers.

s. Spill response procedures.

t. Transportation and disposal. This section shall include all names, addresses, EPA Identification Numbers, and copies of permits for each company providing marking, placarding, labelling, manifesting, transporting, storing and disposing of the wastes. The Contractor shall provide a 24-hour point of contact in regards to transportation or disposal procedures. The Contractor shall submit its Hazardous Waste Management Plan as part of this section.

u. Work plan and schedule for waste containment, removal, and disposal. Waste shall be cleaned up and containerized on a daily basis. In addition, Certificates of Disposal shall be provided within six (6) months after initial transport date. If this is not completed in time, the Government shall have the right to withhold ten (10%) percent of the agreed contract price until completion of this requirement.

v. Liability Insurance for LBP. LBP abatement insurance shall be obtained by the Contractor without additional expense to the Government.

The Contractor shall assume full responsibility and liability for the compliance with Federal, State, and local regulations pertaining to training, work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site.

w. Testing Laboratories names, addresses, and phone numbers. The Contractor shall submit the last three (3) Proficiency Analytical Testing (PAT) Program results to show the laboratory is within standards for Industrial Hygiene Laboratory Accreditation Program (IHLAP).

x. Clearance Plan. The Contractor shall develop a clearance plan describing practices and procedures used to assure that lead hazard control activities are complete and that lead contamination within the lead hazard control area comply with final clearance levels. The Contractor shall comply with all state and local requirements and if required by regulations, perform sampling and analysis to clear lead hazard control areas in the industrial facility. Sampling and analysis procedures used to document project completion and clearance goals shall be explained in this section.

1.8 ACCIDENT PREVENTION PLAN (APP)

1.8.1 APP Content and Organization

The Contractor's Accident Prevention Plan shall be organized into 5 parts, consisting of the overall plan and 4 appendices. The overall plan shall address each element in Appendix A of EM 385-1-1 in project specific detail. The elements are: a. Signature Sheet, b. Background Information, c. Statement of Safety and Health Policy, d. Responsibilities and Lines of Authorities, e. Subcontractors and Suppliers, f. Training, g. Safety and Health Inspections, h. Safety and Health Expectations, Incentive Programs and Compliance, i. Accident Reporting, j. Medical Support, k. Corporate Plans and Programs required by this contract, (HAZCOM, Respiratory Protection).

1.8.1.1 Activity Hazard Analyses Appendix

An Activity Hazard Analysis (AHA) shall be prepared for each work task data element specified on the individual work task data element sheets at the end of this section. The AHA shall be submitted to the Contracting Officer prior to beginning specified work. Format shall be in accordance with EM 385-1-1, figure 1-1. The AHA shall be continuously reviewed and modified, when appropriate, to address changing conditions or operations. Each accepted AHA shall be appended to and become part of the APP.

1.8.1.2 Occupant/Building Protection Plan Appendix

The Contractor shall develop and implement an Occupant/Building Protection Plan describing the measures and management procedures to be taken during lead hazard control activities to protect the building occupants/building facilities from exposure to any lead contamination while lead hazard control activities are performed. The Contractor shall coordinate lead abatement with Washington Aqueduct personnel to ensure the East Shaft Pump Station remains fully operational.

1.8.1.3 Clearance Plan Appendix

The Contractor shall develop a Clearance Plan describing practices and procedures used to assure that lead hazard control activities are complete

and that lead contamination within the lead hazard control area comply with final clearance levels or visual clearance criteria. Sampling and analysis procedures used to document project completion and clearance goals shall be explained in the Clearance Plan Appendix.

1.9 PRE-CONSTRUCTION SAFETY CONFERENCE

1.9.1 Conference General Requirements

The Contractor and the QSHP shall attend a pre-construction safety conference prior to starting work. Items required to be submitted shall be reviewed for completeness, and where specified, for acceptance. Details of the APP shall be revised to correct any deficiencies, and resubmitted for acceptance. Onsite work shall not begin until the APP has been accepted, unless otherwise authorized by the Contracting Officer. One copy of the APP shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to personnel on the site. As work proceeds, the APP shall be adapted to new situations and conditions. Changes to the APP shall be made by the QSHP with acceptance by the Contracting Officer. Should an unforeseen hazard become evident during performance of the work, the QSHP shall inform the Contracting Officer, both verbally and in writing, for immediate resolution. In the interim, the QSHP shall take necessary action to re-establish and maintain safe working conditions; and to safeguard onsite personnel, visitors, the public, and the environment. Disregard for provisions of this specification, or the accepted APP, shall be cause for stopping of work until the matter is rectified.

1.9.2 Preparatory Inspection Meeting

The Contractor shall arrange and hold a preparatory inspection meeting to review completeness and adequacy of the APP immediately prior to beginning each phase of work.

1.10 MEDICAL SURVEILLANCE REQUIREMENTS

The Contractor shall comply with the following medical surveillance requirements:

a. The Contractor shall make every attempt to keep occupational exposure to lead on this project below the action level of 30 micrograms/cubic meter defined in 29 CFR 1926 (.62). The Contractor shall institute a medical surveillance program. The program shall meet the examination frequency and content requirements specified in paragraph (j)(1), (j)(2) and (j)(3) of 29 CFR 1926 (.62). Medical removal as specified in paragraph (k) of 29 CFR 1926 (.62), if necessary, shall be at the Contractor's expense.

b. Medical surveillance and biological monitoring shall be in compliance with 29 CFR 1926 (.62) (g) and (j). Initial biological monitoring shall be performed on lead hazard control workers prior to assignment to the project. Workers shall not be assigned to the project if results indicate a need for restricted activities.

c. All lead hazard control workers shall pass the medical examinations necessary to be approved by the occupational physician to wear respiratory protection on this project. Occupational physician's approval shall be given prior to assignment to the project.

1.11 RESPIRATORY PROTECTION PROGRAM

The Contractor shall have a written respiratory protection program and shall be fully capable of implementing the requirement of the respiratory protection program on this project. The respiratory protection program shall meet the requirements of 29 CFR 1926 (.62) and 29 CFR 1910 (.134). Project specific respiratory protection requirements shall be included in the lead hazard control plan appendix of the Contractor's accident prevention plan.

1.12 LICENCES, PERMITS AND NOTIFICATIONS

The Contractor shall certify in writing to the state's environmental protection agency responsible for lead hazard activities and the Contracting Officer at least 10 days prior to the commencement of work that licenses, permits and notifications have been obtained. The Contractor is responsible for all associated fees or costs incurred in obtaining the licenses, permits and notifications.

1.13 TRAINING

1.13.1 OSHA Training Requirements

All Contractor personnel and/or subcontractors performing or responsible for onsite oversight of lead hazard control activities shall meet the following training requirements.

- a. Content of 29 CFR 1926 (.62) and its appendices.
- b. How operations could result in exposure over the action level.
- c. Purpose, selection, fitting, use and limitations of respirators.
- d. Purpose and description of the medical surveillance program.
- e. Use of engineering controls and good work practices to limit occupational exposure to lead.
- f. Implementation of the lead hazard control plan appendix of the accident prevention plan.
- g. Medical supervision for the use of chelating agents.
- h. Employee right of access to medical surveillance records as specified in 29 CFR 1910 (.20).

1.13.2 Qualified Safety and Health Professional

The qualified safety and health professional shall meet the training requirements in paragraph 1.12.1 and shall meet the training, experience and authority requirements in 29 CFR 1926 (.62) to be a competent person and be trained and have the experience and education to meet 40 CFR 745 Subpart L requirements to carry the following certifications:

- a. Risk Assessor
- b. Certified Project Designer
- c. Certified Supervisor

1.13.3 Abatement Worker

Workers shall meet the OSHA Training Requirements specified above and the training requirements in 40 CFR 745 Subpart L to carry certification as a Certified Worker, if required.

1.13.4 Training Program Certification

Training to meet 40 CFR 745 Subpart L requirements shall be provided by an EPA accredited training provider and the Contractor shall provide proof in the Qualifications and Organization Report showing that personnel have passed certification examinations for their respective disciplines, that fees for certification have been paid to the EPA (or to the state for state-run programs) and that EPA has certified the QSHP, independent risk assessor, certified workers to perform their duties.

1.14 SAMPLING AND ANALYSIS

1.14.1 Sampling and Analytical Procedures

1.14.1.1 Sampling and Analysis Methods

Analysis shall conform to NIOSH Pub No. 84-100 Method 7082, Lead, for personal sampling required by 29 CFR 1926 (.62) Sampling shall conform to ASTM E 1553.

1.14.2 Occupational Exposure Assessment

Sampling and analytical procedures to determine compliance with the occupational exposure monitoring requirement of this section shall be described in the lead hazard control plan appendix of the Contractor's accident prevention plan. Monitoring for the initial determination may be omitted if the Contractor has sufficient proof from previous operations as specified in 29 CFR 1926 (.62) (d) (3) (iii) and (iv) that workers will not be exposed over the action level. The following occupational exposure monitoring requirements apply and shall be implemented if the requirements of 29 CFR 1926 (.62) (d) (3) (iii) and (iv) cannot be demonstrated.

a. During Initial Monitoring the Contractor shall representatively sample employees with the greatest potential for exposure to aerosolized lead.

b. Continued/Additional Monitoring shall meet applicable paragraphs in 29 CFR 1926 (.62) (d) (6), Frequency, after the initial determination has been made.

1.14.3 Lead Hazard Control/Area/Containment Monitoring

The Contractor shall perform a visual inspection once per day outside the lead hazard control area to assure visual clearance criteria are maintained while lead hazard control activities are performed. The Contractor shall clean at its own expense, and to the Contracting Officer's satisfaction, all contaminated surfaces outside the lead hazard control area, if surfaces fail visual clearance criteria.

1.14.4 Waste Disposal Sampling

The Contractor shall sample all waste streams for TCLP analysis to determine waste disposal requirements.

1.14.5 Analytical Results

The Contractor shall develop and maintain during the course of the project a log of analytical results generated by the above sampling requirements. The log shall clearly describe the reason for which the sample was taken (worker exposure, migration control, clearance) the analytical result for each sample and evaluate if the analytical result passed or failed the action levels. At a minimum, the Contractor shall include analytical results for samples required to be taken in paragraphs Occupational Exposure Assessment, Lead Hazard Control Area/Containment Monitoring, Occupancy During Work, and Clearance Monitoring specified above.

1.15 CLEARANCE REQUIREMENTS

The Contractor shall describe clearance requirements for this project in the Clearance Plan Appendix of the Accident Prevention Plan.

a. Clear lead hazard control areas in industrial facilities: visual clearance criteria.

1.16 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The Contractor shall describe the PPE to be used to protect workers from lead hazards in the Lead Hazard Control Plan Appendix of the Accident Prevention Plan. The Contractor shall furnish, at no cost to the workers, clothing for protection from lead-contaminated dust and debris. An adequate supply of these items shall be available for worker and Government personnel use. Protective clothing shall include:

a. Coveralls : Full-body moisture permeable (breathable) disposable coveralls shall be provided to lead hazard control workers.

b. Boots: Boots and shoes shall be provided as required by EM 385-1-1 Section 05.A.08 for workers. Boot/shoe covers shall be provided to prevent contamination of boots and shoes.

c. Hand Protection: Gloves, etc., shall be provided as required by EM 385-1-1 Section 05.A.10 for workers.

d. Head Protection: Hard hats shall be provided as required by 29 CFR 1910 (.135) and EM 385-1-1 Section 05.D for workers and authorized visitors.

e. Eye and Face Protection: Eye and face protection shall be provided as required by 29 CFR 1910 (.133) and EM 385-1-1 Section 05.B for workers and authorized visitors.

f. Respirators: NIOSH certified air-purifying respirators or filtering face pieces shall be provided for use as respiratory protection for airborne lead and for other hazardous airborne contaminants that may be encountered; as determine by the on-site safety and health supervisor. At a minimum, respirators shall be furnished to each employee required to enter a lead hazard control area where an employee exposure assessment has not yet been performed, or where monitoring data establishes the need for respiratory protection, or if requested by the employee.

g. Respirator Cartridges/Filtering Face Pieces: Respirator cartridges shall be changed out/filtering face pieces properly disposed of when the they become sufficiently loaded with particulate matter that workers experience breathing resistance. Cartridges and filtering face pieces

shall be N, R or P 100 rated to assure sufficient protection from lead exposure.

1.17 HYGIENE FACILITIES

The Contractor shall describe the personal hygiene facilities to be used by the workers in the Lead Hazard Control Plan Appendix of the Accident Prevention Plan. The Contractor shall provide hygiene facilities for lead hazard control workers. Hygiene facilities shall consist of the following:

1.17.1 Hand Wash Stations

The Contractor shall provide hand washing facilities for use by lead hazard control workers. Hand washing facilities shall comply with the requirements in 29 CFR 1926 (.51) (f). Faces and hands shall be washed when leaving the lead hazard control area and after each work-shift if showers are not provided.

1.17.2 Change Area

The Contractor shall provide a change area to workers. The change area shall be equipped so that contaminated work clothing and street clothes shall be stored separately to prevent cross contamination.

1.17.3 Showers

Showers shall be provided if feasible and if worker exposures exceed the PEL. When provided, showers facilities shall meet the requirements of 29 CFR 1926 (.51) (f).

1.17.4 Eating Area

The Contractor shall set aside an area or provide a room for taking breaks and eating lunch. This area shall be kept as free as practicable from lead contamination. Workers shall be required to follow the procedures in 29 CFR 1926 (.62) (i) (4) when using the room.

1.18 POSTED WARNINGS AND NOTICES

The following regulations, warnings, and notices shall be posted at the worksite in accordance with 29 CFR 1926 (.62).

1.18.1 Regulations

At least two copies of 29 CFR 1926 (.62) shall be made available for use by either the Contracting Officer or affected workers; and for the purpose of providing required information and training to the workers involved in the project. One copy shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to workers on the site.

1.18.2 Warning Signs and Labels

Warning signs shall be posted in each lead hazard control area where worker exposure to lead is undetermined or where the exposures are above the permissible exposure limit as defined in 29 CFR 1926 (.62). Signs shall be located to allow personnel to read the signs and take necessary precautions before entering the lead hazard control area.

1.18.2.1 Warning Signs

Warning signs shall be in English and be of sufficient size to be clearly legible, and display the following:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

1.18.2.2 Warning Labels

Warning labels shall be affixed to all lead waste disposal containers used to hold materials, debris and other products contaminated with lead hazards; warning labels shall be in English and be of sufficient size to be clearly legible, and display the following:

CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY
BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN
ACCORDANCE WITH APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS.

1.18.3 Worker Information

Right-to-know notices shall be placed in clearly visible areas accessible to personnel on the site, to comply with Federal, state, and local regulations.

1.18.4 Air Monitoring Results

Air monitoring results shall be prepared so as to be easily understood by the workers. One copy shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to the workers as specified in 29 CFR 1926 (.62).

1.18.5 Emergency Telephone Numbers

A list of emergency telephone numbers shall be posted at the site. The list shall include numbers of the local hospital, emergency squad, police and fire departments, Government and Contractor representatives who can be reached 24 hours per day, and professional consultants directly involved in the project.

1.19 MATERIALS AND EQUIPMENT

Sufficient quantities of health and safety materials required by 29 CFR 1926 (.62), and other materials and equipment needed to complete the project, shall be available and kept on the site.

1.19.1 Abrasive Removal Equipment

The use of powered machine for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

1.19.2 Vacuum Systems

Vacuum systems shall be suitably sized for the project, and filters shall

be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent. Used filters that are being replaced shall be disposed in a proper manner.

1.19.3 Chemical Paint Strippers

Chemical paint strippers shall not contain methylene chloride and shall be formulated to prevent stain, discoloration, or raising of the substrate materials. Strippers shall not be used on the brick to remove lead based paint.

1.19.4 Chemical Paint Stripper Neutralizer

Neutralizers for paint strippers shall be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

1.20 EXPENDABLE SUPPLIES

1.20.1 Polyethylene Bags

Disposable bags shall be polyethylene plastic and shall be a minimum of 6 mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and shall be capable of being made leak-tight. Leak-tight means that solids, liquids or dust cannot escape or spill out.

1.20.2 Polyethylene Leak-tight Wrapping

Wrapping used to wrap lead contaminated debris shall be polyethylene plastic that is a minimum of 6 mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.

1.20.3 Polyethylene Sheeting

Sheeting shall be polyethylene plastic with a minimum thickness of 6 mil, or any other thick plastic material shown to demonstrate at least equivalent performance; and shall be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, flame-resistant polyethylene sheets which conform to the requirements of NFPA 701 shall be provided.

1.20.4 Tape and Adhesive Spray

Tape and adhesive shall be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive shall retain adhesion when exposed to wet conditions, including amended water. Tape shall be minimum 2 inches wide, industrial strength.

1.20.5 Containers

When used, containers shall be leak-tight and shall be labeled in accordance with EPA, DOT and OSHA standards, as specified in paragraph WARNING LABELS.

1.20.6 Chemicals

Chemicals, including caustics and paint strippers, shall be properly labeled, used in accordance with the manufacturers recommendations and stored in leak-tight containers. Material Safety Data Sheets (MSDSs) shall be provided and hazard communication procedures implemented in conformance with paragraph HAZARD COMMUNICATION PROGRAM.

1.21 STORAGE OF MATERIALS

Materials shall be stored protected from damage and contamination. During periods of cold weather, plastic materials shall be protected from the cold. Flammable or hazardous materials shall not be stored inside a building. Materials shall be regularly inspected to identify damaged or deteriorating items. Damaged or deteriorated items shall not be used and shall be removed from the site as soon as they are discovered. Stored materials shall not present a hazard or an inconvenience to workers, visitors, and/or other occupants and employees of the facility in which they are located.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 WORK PROCEDURES

The Contractor shall perform work following practices and procedures described accident prevention plan.

3.1.1 Lead Hazard Control Areas, Equipment and Procedures

The Contractor shall set up lead hazard control areas and operate equipment within the lead hazard control area in a manner that will minimize migration of lead dust beyond the lead hazard control area boundaries and minimize exposure to workers.

3.1.2 Lead Hazard Control Areas

Access into lead hazard control areas by the general public shall be prohibited. Workers entering the lead hazard control area shall meet medical surveillance requirements of this contract and shall be required to understand and follow procedures described in the Contractor's accident prevention plan for reducing lead exposure. Lead hazard control area preparation and restriction requirements follow:

a. Containment features for interior hazard control projects: Polyethylene sheeting sealed with spray adhesive and duct tape. Portable plastic partitions and colored caution tape to designate the lead hazard control area. The entry/exit shall be sealed with a primitive air lock. Opening such as HVAC supply and return air vents into the lead hazard control area shall be sealed with polyethylene sheeting and duct tape or with sealed rigid coverings.

3.2 USE OF HYGIENE FACILITIES

a. Personnel and equipment shall be decontaminated when exiting the lead hazard control area. The Contractor shall comply with the following personnel and equipment decontamination procedures:

- (1) HEPA vacuum outer garments and equipment.

- (2) Wet Wipe Equipment.
- (3) Remove outer layer of garments.
- (4) Thoroughly wash face and hands, if showering not required.
- (5) Shower (if applicable).
- (6) Remove Respirator (if applicable).
- (7) Exit lead hazard control area.

b. The Contractor shall provide, and workers shall use, a change room to change into work clothing at the beginning of a work shift. At the end of the work shift workers shall change back into street clothing and leave contaminated work clothing at the site for disposal or laundering.

c. The Contractor shall provide an eating facility as free as practical from lead contamination. Workers shall be allowed usage of the eating facility for rest/lunch breaks.

3.3 FURNISHINGS

The Contractor shall remove furniture and equipment from the work area before lead hazard control work begins.

3.4 WASTE DISPOSAL PROCEDURES

3.4.1 Waste Stream Classification

The Contractor shall determine the RCRA waste classification for all waste streams generated by the lead hazard control project. The Contractor shall perform the sampling and analysis specified in paragraph WASTE DISPOSAL, evaluate analytical results and propose waste stream treatment and disposal requirements for the contract. The Contracting Officer will approve waste stream treatment and disposal requirements proposed by the Contractor.

3.4.2 RCRA Subtitle C Hazardous Waste

The Contractor shall dispose of the following waste streams at the RCRA subtitle C Treatment Storage and Disposal Facility or at the RCRA Subtitle C hazardous wastes landfill: Building demolition debris, Dust and paint chips from HEPA vacuuming operations and Paint Sludge and residue from chemical or heat stripping procedures.

3.4.3 Hazardous Waste Transportation and Disposal

The Contractor shall transport, treat and dispose of hazardous waste in accordance with all Federal, State, and local requirements and regulations. Disposal of hazardous waste shall be scheduled with the Contracting Officer's Representative no less than three (3) days prior to shipment.

3.5 LEAD HAZARD CONTROL PROCEDURES, METHODS AND TECHNIQUES

3.5.1 Surface Refinishing

Treated surfaces shall be painted or otherwise sealed. Surfaces to be painted to control lead hazards shall be prepared and painted in accordance with the following requirements.

3.5.1.1 Painted Surfaces

Painted Surfaces shall be treated in accordance with Section 09900 Paints and Coatings.

3.5.2 Enclosure Systems

Enclosure systems shall use rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between the lead-based paint and the environment. Surfaces to be enclosed shall be labeled (behind the enclosure), horizontally and vertically, approximately every 2 feet with the warning:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

3.5.3 Paint Removal Methods

Prohibited paint removal methods shall include: open flame burning or torching, including the use of heat guns having operating temperatures greater than 1,100 degrees F; machine sanding or grinding without HEPA exhaust; non-contained hydro blasting or high-pressure water wash; abrasive blasting or sandblasting without HEPA exhaust; dry scraping, except near electrical outlets or when using a heat gun. Chemical paint removers are prohibited for brick work. Building components and structures adjacent to the removal process shall be appropriately protected from damage due to the removal process employed. Stripping shall be done according to manufacturer's recommendations.

3.5.3.1 Low Temperature Heat Gun

Prior to beginning work, electrical fuses and adequate electrical supply shall be verified. Only fuses properly sized for the service, and otherwise permitted by code, shall be used. Properly sized fuses shall not be changed out with larger fuses to increase amperage beyond safe limits. Portable electric generators may be used to safely supply adequate amperage. An accessible garden hose with a pressure-release spray nozzle; a crowbar to remove smoldering wood; and a long-handled sledgehammer to open up walls exposed to smoldering insulation shall be readily available. A fully charged ABC-type (20 pound minimum) fire extinguisher shall be available within 100 feet of the work area. Adequate ventilation shall be provided for the work area. Worker protection shall include respirators equipped with combination HEPA filter/organic vapor cartridges. The Contractor shall equip heat guns with extension tubes or wire mesh as needed to prevent premature burnout of the heating elements and to minimize paint film scorching or smoking. Optimal heat gun/substrate separation is typically 3 to 6 inches.

3.5.3.2 HEPA Sanding

The HEPA vacuum shall be correctly sized to provide adequate airflow, permitting the system to operate properly. If longer exhaust hoses are used, a larger HEPA vacuum shall be provided to handle the extra pressure drop in the vacuum hose. The HEPA filter shall be operated in accordance with manufacturer's instructions. Worker protection shall include respirators or filtering facepieces equipped with HEPA filters.

3.5.3.3 Wet Scraping

Surfaces near electrical outlets shall not be moistened but shall be dry scraped only. Loose material shall be scraped from the surface and

deposited onto the containment plastic. Damp scrapings shall be cleaned up as soon as possible to prevent tracking throughout the work area. Scraper blades shall be kept sharp. Additional scraper blades shall be supplied and shall be selected for the type of surface being scraped.

3.5.3.4 HEPA Vacuum Blasting

The blast head shall be shrouded under a vacuum and exhaust passed through a HEPA filter. The blast head shall remain in continuous contact with the surface to avoid dispersal of both the blast medium and particulate. The equipment shall be equipped with a device that separates the blast media from the material to be removed, effectively recycling the blast material and minimizing the amount of waste. Work shall be positioned to minimize the degree workers must reach above shoulder level, in order to minimize worker fatigue and loss of blast head contact with the surface.

3.5.3.5 HEPA Vacuum Needle Gun

The vacuum needle gun head shall be equipped with a vacuum shroud designed for the surface to be treated. The needle gun shall be operated to maximize surface contact of the vacuum shroud. Work shall be positioned to minimize the degree workers must reach above shoulder level, in order to minimize worker fatigue and loss of needle gun contact with the surface.

3.5.3.6 Onsite Paint Removal

Paint remover shall be applied in accordance with the manufacturer's instructions. The work area surrounding the application process shall be secured to prevent access unauthorized personnel. Workers shall be provided with the appropriate personal protective clothing and equipment in accordance with manufacturer's recommendations and good industrial hygiene practice. A portable eyewash shall be provided whenever eye irritant strippers are used. An abundant source of running water shall be provided in the work area. The stripper shall be tested in a small area prior to full scale stripping. Caustic strippers shall not be used on aluminum or glass surfaces. Waste disposal shall be in accordance with paragraph WASTE DISPOSAL PROCEDURES. Stripped surfaces shall be neutralized and washed in accordance with manufacturer's instructions and paragraph CHEMICAL PAINT STRIPPER NEUTRALIZER. Stripped surfaces shall be completely dry before repainting, and shall be repainted only with paints proven compatible with the stripping techniques employed.

3.6 CLEARANCE PROCEDURES

3.6.1 Visual Inspection

QSHP shall perform a visual inspection, using the form at the end of this section, for each lead hazard control area to assure that lead hazard control activities, identified in the individual work task data elements, have been properly completed. The QSHP shall visually verify that lead hazards have been removed, control technology has been appropriately applied/installed and that the lead hazard control area is free of dust and paint chips generated by lead hazard control activities.

3.7 EVALUATION OF SAMPLING AND MONITORING RESULTS

Analytical results from samples taken during lead hazard control activities shall be evaluated to determine compliance with occupational safety and health standards and project specific control efficiency and

clearance/clean up levels.

3.7.1 Occupational Safety and Health

The QSHP shall review the analytical results from samples taken for the initial exposure assessment and continued occupational safety and health monitoring if required. Effectiveness and adequacy of personal protective equipment, respirators, work practices, hygiene facilities and personal decontamination procedures shall be evaluated and upgrades/downgrades in equipment and procedures made. After notifying the Contracting Officer the following shall be applied:

- a. Exposures over the PEL (0.05 mg/cubic meter):
 - (1) Improve work practices to reduce exposures.
 - (2) Don respirators.
 - (3) Assure eating facilities and change rooms are clean and are free from settled dust.
 - (4) Shower as part of personal decontamination.
- b. Exposures over the Action Level (0.03 mg/cubic meter):
 - (1) Assure exposed individuals enrolled in the medical surveillance program.
 - (2) Assure exposed individuals enrolled in and up to date with lead exposure training requirements.

3.7.2 Control Efficiency of Containment Features

The QSHP shall review and document results of the visual inspection determining visual clearance criteria are being met while lead hazard control activities are being performed. The QSHP shall review analytical results from samples taken to determine if lead is migrating outside lead hazard control areas at levels in excess of clearance criteria. The QSHP shall notify the Contracting Officer and apply the following actions if results exceed project specific clearance levels outside the lead hazard control area:

- a. Require/improve containment.
- b. Improve work practices to reduce lead aerosol generation.

3.7.3 Removal of Lead Hazard Control Area

Upon acceptance of the final clearance certification by the Contracting Officer, and when authorized, cleared Lead Hazard Control Area boundary controls and warning signs shall be removed.

3.8 CLEARANCE REPORT

The QSHP shall prepare a clearance report including the following information:

inspection, finds the Contractor's work to be:

_____ Acceptable, ready for performance of clearance sampling

_____ Unacceptable, Contractor instructed to re-clean the lead hazard control area

BY: Contracting Officer's Representative

Signature Date

Print name and title_____

Lead Hazard Control Clearance Sampling Certification Form

Date_____

Name of QSHP or Certified Risk Assessor_____

License No._____

Work Task Data Element _____

Clearance Levels_____

- 40 CFR 745 Clearance Levels
- 24 CFR 35 Clearance Levels

Sample quantity and location:

Windows _____

Floors _____

Exterior Soils _____

Date of sample collection_____Date Shipped to lab_____

Shipped by_____ Signature

I certify that the clearance samples taken meet the clearance sampling requirements of this contract.

By:_____ Date:_____
QSHP or independent risk assessor

Print name and Title:_____

CONTRACTING OFFICER ACCEPTANCE OR REJECTION

I have inspected sampling locations and procedures and have found them to be

_____Acceptable, meet contract requirements.

_____Unacceptable, do not meet contract requirements, Contractor is directed to resample.

By: Contracting Officer's Representative

Signature

Date

Print Name and Title _____

INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 1 of 1

There is a separate data sheet for each individual work task.

WORK TASK DESIGNATION NUMBER: 01

2. LOCATION OF WORK TASK: Dalecarlia Pump Station

3. BRIEF DESCRIPTION OF THE LEAD HAZARD CONTROL ACTIVITY:
Removal of LBP from pipes, valves and other members indicated in
specification 09900, as needed to meet surface preparation requirements
for repainting.

4. POST LEAD HAZARD CONTROL BUILDING/FACILITY USE: INDUSTRIAL

5. LEAD CONTAMINATED DEBRIS DISPOSAL DESTINATION: Construction
Debris/Sanitary or Rcra Subtitle C Landfill.

6. CLEARANCE REQUIREMENTS: VISUAL

-- End of Section --

SECTION 13405A

PROCESS CONTROL

07/01

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.1 (1995) Code for Electricity Metering

ASME INTERNATIONAL (ASME)

ASME FM (1971; Sixth Edition) Fluid Meters Their Theory and Application

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.90 (1989; R 1994) Relays and Relay Systems Associated with Electric Power Apparatus

IEEE C62.41 (1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits

IEEE Std 142 (1991) IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

IEEE Std 8802-3 (2000) Information Technology - Telecommunications and Information Exchange Between Systems - Specific Requirements - Amendment to Local and Metropolitan Area Networks - Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Aggregation of Multiple Link

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1 (1993) Industrial Control and Systems

NEMA ICS 2 (1993) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC

NEMA ICS 4 (1997) Industrial Control and Systems Terminal Blocks

NEMA 250 (1997) Enclosures for Electrical Equipment (100 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (1999) National Electrical Code

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST SP 250 (1995) Calibration Service Users Guide

UNDERWRITERS LABORATORIES (UL)

UL 508 (1999) Industrial Control Equipment

UL 1059 (1993; 3rd Edition) Terminal Blocks

1.2 CONTROL SYSTEM DESCRIPTION

The process instrumentation and control system and the modifications to the existing SCADA system at DPS specified in Section 13621 shall be used to monitor and control the operation of process equipment as specified and in accordance with the sequence of control and control schematics shown on the drawings. The control system shall provide for operator interaction, overall control system supervision, and process equipment control and monitoring. The Contractor shall provide hardware configured and sized to support expansion as specified and shown on the drawings.

1.2.1 Control System General Requirements

The control system shall include the addition of instruments and controls specified in this specification section and improvements and expansion of the existing SCADA/BBI (Bristol Babcock Inc.) control system specified in specification section 13621. The purpose of this project shall be to provide additional monitoring and control for the Dalecarlia Pump Station (DPS) and improve communications to remote sites served through the existing SCADA system. Communication from each site to the DPS shall be;

<u>SITE</u>	<u>COMMUNICATION</u>
Great Falls PS	Phone
Interconnect No. 1	Phone
Interconnect No. 3	Radio repeated through Little Falls PS
Little Falls PS	Radio to Dalecarlia Receiver
Booster PS	Corps dedicated cable
1st High Reservoir	Radio to Dalecarlia Receiver
Georgetown Reservoir	Radio to Dalecarlia Receiver
2nd High Reservoir	Radio repeated through repeater station near 3rd High
3rd High Reservoir West	Radio repeated through repeater station near 3rd High
3rd High Reservoir East	Radio repeated through repeater station near 3rd High
Repeater Station Near 3rd High	Radio to Dalecarlia Receiver

The inputs and outputs (I/O) for each site are:

LOCATION	RTU	AI	AO	DI	DO
GREAT FALLS PS		6	0	3	4
INTERCONNECT 1		2	0	2	0
INTERCONNECT 3		2	0	2	0
LITTLE FALLS PS		20	0	71	41
BOOSTER PS		11	0	29	31
1ST HIGH RES		4	0	4	0
2ND HIGH RES		4	0	4	0
3RD HIGH RES EAST		4	0	4	0
3RD HIGH RES WEST		4	0	4	0
GEORGE TOWN RES		6	0	4	0
TOTAL I/O BY RTU		65	0	129	76

The Dalecarlia radio receiver shall connect to the Ethernet control LAN using an Ethernet switch.

The fiber Ethernet link, specified in specification section 16768A shall be expanded and extended between the pump station, the control room in the chemical building and the communications room in the Dalecarlia administration building. The fiber routing is shown on the electrical drawings. The expanded network will provide a separate control LAN (the business network and control network shall be separate for security reasons) and shall provide a communications backbone from the radio receiver in the administration tower to the existing chemical building control room and the pump station control room.

The control console in the chemical building control room shall include three (3) new workstations. The workstations shall have both Ethernet and serial communications ports. The communications ports shall allow the workstation to communicate over the expanded control LAN or the older BBI serial network. This dual mode of communication shall be required because the project to migrate all BBI workstations, servers, MUX and other peripherals to Ethernet may not be completed prior to the completion of this project. The three new workstations, specified in these specifications shall replicate the workstations that now exist at the pump station control room. This duplicity of physical and functional control shall allow for the smooth migration of operations and control from the existing pump station control room to the expanded control room and control functions of the chemical building control room.

The chemical building control room will also house the new control system historian specified in Section 13622. The historian shall receive information from the BBI system. The historian will compress and store information. This information may be viewed on the plant control workstations. The information may also be available to staff within the plant across the business LAN. To maintain cyber security a fire wall shall be placed between the historian application server and the business LAN. This bridge between the business and control LAN shall also be used to integrate the facilities LIMS and computerized maintenance management system (CMMS). The historian will provide data validation for LIMS and real-time operating information for CMMS.

ADDITIONAL MONITORING AND CONTROL

In addition to the expansion of the BBI system this contractor shall provide additional monitoring within the pump station. The work shall include;

Reverse rotation sensors. The sensor will be installed ancillary to the pump shafts. The sensors will close a relay on reverse rotation. The relay will be configured as an alarm in the BBI control system and shall be configured to stop the pump or prevent the pump from starting during reverse rotation. The sensor shall not prevent the pump and motor from reverse rotation.

Pressure transmitter. A pressure transmitter shall be installed on the discharge header of each pump. The transmitter shall transmit pump discharge pressure to the control system. The control system will monitor and record pressure and alarm on high discharge pressure. High pressure shall be alarmed in the control system and shall be wired into the pump start circuit in series with the reverse rotation sensor relay to stop the pump of high discharge pressure.

Zone pressure. A pressure transmitter will be provided on each pump station pressure zone header. The transmitter shall input to the BBI system so operations can monitor and record pressure and aid in determining if pumps need to be started or stopped to provide more or less pressure to the; low service area, 1st high service area, 2nd high service area or 3rd high service area.

Sump alarms. Float switches shall be provided in the existing east and west sump pump sumps. These switches will output high level alarms to the BBI system to indicate pump failure and potential flooding.

Sewage ejector alarm. Ejector malfunction causes drainage backups. To alarm a backup a point level switch shall be provided on the 6-inch drain line were the line drains into the ejectors. The switch shall be installed in a 6X2X6 tee. The 2-inch branch shall include a 2-inch full-port SS ball valve. The point level switch will be mounted through the valve. The switch will be mounted such that the alarm point will be located just above the crown on the 6-inch drain line. The placement of the switch contact point will be set to detect plugging but should not cause nuisance alarm.

Valve position monitoring. A major portion of the work in the PS shall be to provide new valves and operators. All new valves will be provided with switches to indicate wether the valve is opened or closed. The open/close contacts shall input to the BBI system. The valves include:

VALVE NO.	SERVICE	TYPE	INPUT/OUTPUT				CONTROLS
			AI	AO	DI	DO	
VALVES FOR REPLACEMENT							
PV-22	PUMP CHECK VALVE	ROTARY OR CONE			2		INTERLOCK W/PUMP. DCS POSITION
PV-23	PUMP CHECK VALVE	ROTARY OR CONE			2		INTERLOCK W/PUMP. DCS POSITION
PV-24	PUMP CHECK VALVE	ROTARY OR CONE			2		INTERLOCK W/PUMP. DCS POSITION
PV-25	PUMP CHECK VALVE	ROTARY OR CONE			2		INTERLOCK W/PUMP. DCS POSITION

PV-26	PUMP CHECK VALVE	ROTARY OR CONE	2	INTERLOCK W/PUMP. DCS POSITION
PV-27	PUMP CHECK VALVE	ROTARY OR CONE	2	INTERLOCK W/PUMP. DCS POSITION
PV-29	PUMP CHECK VALVE	ROTARY OR CONE	2	INTERLOCK W/PUMP. DCS POSITION
PV-31	PUMP CHECK VALVE	ROTARY OR CONE	2	INTERLOCK W/PUMP. DCS POSITION
PV-34	PUMP CHECK VALVE	ROTARY OR CONE	2	INTERLOCK W/PUMP. DCS POSITION
PV-35	PUMP CHECK VALVE	ROTARY OR CONE	2	INTERLOCK W/ PUMP. DCS POSITION
BV-65	SYSTEM ISOLATION	BUTTERFLY	2	OPEN/CLOSE.DCS POSITION
BV-66	SYSTEM ISOLATION	BUTTERFLY	2	OPEN/CLOSE.DCS POSITION
BV-47	SYSTEM ISOLATION	BUTTERFLY	2	OPEN/CLOSE.DCS POSITION
BV-48	SYSTEM ISOLATION	BUTTERFLY	2	OPEN/CLOSE.DCS POSITION
RV-69	REGULATOR	GLOBE		

VALVE NO.	SERVICE	TYPE	INPUT/OUTPUT				CONTROLS
			AI	AO	DI	DO	
OPTION VALVES FOR REPLACEMENT							
BV-7	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-8	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-9	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-10	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-11	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-12	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-13	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-14	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-15	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-16	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-17	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-18	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-19	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-20	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-21	PUMP SUCTION VALVE	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-41	SYSTEM ISOLATION	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-56	SYSTEM ISOLATION	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-60	SYSTEM ISOLATION	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
BV-63	SYSTEM ISOLATION	BUTTERFLY	2				OPEN/CLOSE. DCS POSITION
TOTAL I/O			66				

The new valves specified in section 15201 shall be provided with the position switches. The switches shall be wired to existing or spare I/O in the BBI control system.

1.2.2 Control System Operation

The control system provided under this specification shall operate using the existing Bristol Babcock SCADA system specified in Section 13621 and new RTUs. Input data to the controller shall be obtained by using instruments and controls interfaced to mechanical, electrical, utility systems and other systems as shown and specified. All required setpoints, settings, alarm limits, and sequences of operation shall be as identified on the drawings and these specifications.

1.2.3 Control System Points

Inputs to and outputs from the control system shall be in accordance with the Input/Output (I/O) shown on the drawings and or as listed in the specifications. Each connected analog output (AO), analog input (AI), digital output (DO), digital input (DI), and other input or output device connected to the control system shall represent a "point" where referred to in this specification.

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-02 Shop Drawings

Installation; G AE

Wiring; G AE

Detail drawings containing complete piping, wiring, schematic, flow diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Piping and Instrumentation (P&ID) and Loop drawings (prepared using industry recognized device symbols, clearly defined and describing piping shop drawings designations to define the service and materials of individual pipe segments and instrument tags employing Instrument Society of America suggested identifiers). Drawings shall include, as appropriate: product specific catalog cuts; a drawing index; a list of symbols; a series of drawings for each control system using abbreviations, symbols, nomenclature and identifiers.

All drawings shall be submitted on 11 x 17-inch sheets. Provide only one control loop per sheet. Loop drawings may be submitted on multiple sheets.

SD-03 Product Data

Instrumentation and Control System; G WA

Manufacturer's descriptive and technical literature, performance charts and installation instructions. Product specific catalog cuts shall be in 8 1/2 x 11 3-ring D binders and 11 x 17 3-ring binders for all loop diagrams, indexed to the unique identifiers, and shall consist of data sheets that document compliance with the specification. Where multiple components are shown on a catalog cut, the application specific component shall be marked.

Meters and Sensors; G WA

Manufacturer's descriptive and technical literature, catalog cuts, performance charts and installation instructions.

Performance Verification Test (PVT); G WA

The performance verification test procedure; it shall refer to the actions and expected results to demonstrate that the control system performs in accordance with the sequence of control. A

list of the equipment to be used during the testing shall be included. The list shall also include manufacturer's name, model number, equipment function, the date of the latest calibration and the results of the latest calibration.

Factory Test Procedure; G WA

Documentation containing factory test methods and procedures.

SD-06 Test Reports

Factory Test Report; G WA

Testing, Adjusting and Commissioning; G WA

Performance Verification Test (PVT); G WA

Endurance Test; G WA

Test results in report format.

SD-07 Certificates

Sensor and Control Wiring; G WA

Certified test results for surge protection.

Testing of Ground Rods; G WA

Certification stating that the test was performed in accordance with IEEE Std 142.

SD-10 Operation and Maintenance Data

Instrumentation and Control System; G WA

Six complete copies of operating instructions outlining the step-by-step procedures required for system startup, operation and shutdown. The instructions shall include layout, wiring and control diagrams of the system as installed. The instructions shall include the manufacturer's name, model number, service manual, parts list and a brief description of all equipment and their basic operating features.

Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs and trouble shooting guides.

1.4 EQUIPMENT REQUIREMENTS

1.4.1 Materials and Equipment

Materials and equipment shall be standard unmodified products of a manufacturer regularly engaged in the manufacturing of such products. Units of the same type of equipment shall be products of a single manufacturer. Items of the same type and purpose shall be identical and supplied by the same manufacturer, unless replaced by a new version approved by the Government.

1.4.2 Nameplates

Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Laminated plastic nameplates shall be provided for equipment devices and panels furnished. Each nameplate shall identify the device, such as pump "P-1" or valve "VLV-402". Labels shall be coordinated with the schedules and the process and instrumentation drawings. Laminated plastic shall be 1/8 inch thick, white with black center core. Nameplates shall be a minimum of 1 by 3 inches with minimum 1/4 inch high engraved block lettering. Nameplates for devices smaller than 1 by 3 inches shall be attached by a nonferrous metal chain. All other nameplates shall be attached to the device with stainless steel screws.

PART 2 PRODUCTS

2.1 METERS AND SENSORS

Equipment located outdoors shall be housed in 316 stainless steel NEMA 4X enclosures, unless otherwise specified. Equipment and wiring must be in accordance with NFPA 70, with proper consideration given to environmental conditions such as moisture, dirt, corrosive agents, and hazardous area classification.

2.2 MONITORING AND CONTROL PARAMETERS

The control system shall be complete including sensors, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, engineering units conversions and algorithms for the applications; and shall maintain the specified end-to-end process control loop accuracy from sensor to display and final control element. Control equipment shall be powered by a 120 VAC, single phase, 60 Hz power source, with local transformers included as needed for signal transmission and subsystem operation. Connecting conductors shall be suitable for installed service. Enclosures shall be rated for NEMA 4X, 7, 12 and as indicated on the electrical drawings.

2.2.1 Conductivity Level Switch

Provide a compact switch to detect the presence of a fluid by measuring the electrical resistance between two electrode. The electrodes shall be constructed of 316-Ti stainless steel. The electrodes shall be housed in Ryton. The switch shall be SPDT rated at 1 AMP max at 24 VDC. The switch emersion length shall be approximately 3-inches. The switch shall be equal to Kobold NEK-3173, GEM, STI or approved equal.

2.2.2 Non-Mercury Float Switch

Float switch assemblies for use in liquid systems shall consist of wall bracket or mounting plate, stainless steel bolts, explosion proof and corrosion resistant housing, and intrinsically safe relays. Each switch shall consist of one SPST 5 AMP 120 VAC non-mercury micro switch, encapsulated in epoxy resin. The float casing shall be polypropylene. The switch cable shall be oil resistant thermoplastic cable with 4 No. 18 gauge stranded copper conductors, rated for 600 Volt application.

2.2.3 Ultrasonic Level Measurement

Provide ultrasonic level element (LE) and transmitter (LIT). The level

element shall measure level in the Georgetown reservoir. Provide level measurement in basin one (1) and two (2) and in the gate house. The LE/LIT shall be located as shown on the electrical drawings. Provide a LE/LIT to sense reservoir level over a range of 0 - 20 feet (0-6m). The LE/LIT shall have a beam angle not greater than 8° and a blocking distance not greater than 2-feet (0.6m). The LE/LIT shall have a measurement error of 0.2% of measuring range and resolution of 0.08-inches (2mm). The LIT shall have an LCD display to display measured process variable and provide means to set-up and calibrate instrument. The LE (transducer) shall have a CPVC or PFA housing with integral temperature compensation. The LIT (transmitter) shall be cast aluminum and shall be rated NEMA 4X. The complete unit (LE/LIT) may operate over a temperature range of -40 to 160 F (-40 to 70 C). The transmitter shall be integral with the transducer. The unit shall be provided with all mounting hardware for pipe rail or floor mounting so that the unit can measure reservoir level. The transmitter shall output a 4-20 mA signal proportional with measured level. Provide detailed instructions for proper installation of the sensor, transmitter and mounting hardware. Provide detailed wiring diagrams for completion of the ISA 5.4 loop diagrams and installation by the integrator and electrical contractor.

2.2.4 Pressure Switch

Sensors shall be piezoresistive ceramic. All wetted parts shall be 316 stainless steel. Switch shall be accurate to $\pm 1.0\%$ of maximum range. The set point repeatability shall be $\pm 0.2\%$ of maximum range. Switch actuation set point shall be adjusted over the operation pressure range with a differential adjustment span of 0 to 100 percent of the range of the switch. The switch shall be SPSP at 15 AMP at 24-120 VAC. The switch shall have a range of 0-300 PSIG. The switch shall have a 2 row 16 character LCD display. The display shall show processed measured pressure in engineering units and shall be used to configure the switch. The switch enclosure shall be NEMA 4X. The switch shall be United Electric ONE series Ashcroft, SOR or approved equal.

2.2.5 Pressure (Differential Pressure) Transmitter

Provide a differential pressure transmitter to measure pressure for each pump header and for each service area leaving the pump station. The pressure range shall be 0-300 PSIG. The pressure transmitter shall be connected to the process piping with a 1/2-inch 316 rigid stainless steel tube. The tubing shall be connected to the transmitter manifold and the manifold shall be mounted to the transmitter such that the transmitter may be removed from the process without disconnecting the process connections. The transmitter shall be microprocessor based using piezoresistive strain gauge. The transmitter shall output 4-20 mA proportional to the measured pressure. The transmitter shall be provided with 2-way communications. Provide HART communications digital process variable superimposed on 4 to 20 mA signal, with protocol based on Bell 202 FSK standard. Provide transmitters that shall be electronically calibrated by methods of a handheld calibrator from any point in the current signal loop. Provide integral LCD indicator that displays user-defined variables like rates and signal output and provide tuning parameters and diagnostic messages. Provide transmitter with; 316 diaphragm and all wetted part, silicone filling media, 316 SS 1/2-inch NPT process connections, 1/2-inch NPT conduit connections and an enclosure rated for NEMA 4X/IP65/NEMA 7 CLASS I Div 1 Group A, B, C and D. Provide transmitter with dog-bone type manifold. Provide transmitter by ABB, or approved equal.

2.2.6 Temperature Element/Temperature Transmitter (RTD)

Provide platinum RTD bolt-on temperature element. Provide temperature elements and transmitters (TE/TIT) to measure bearing temperatures on each (15) Finished Water Pump (2 bearings per pump). Provide 316 SS tapping screw to mount the TE to the outside of the bearing housing. Provide 2-wire, 100 OHM, platinum RTD with stainless steel braid over insulated leads. Provide temperature assemble for installation in existing pump bearings. Provide 0.265-inch (6.7mm) ID ring-lug style sensor. Provide remote mounted temperature indicating transmitter. Transmitter shall receive input from RTD and output 4-20 mA DC to the control system. The temperature range shall be 0-150 F (0-65 C). The instrument shall be accurate to $\pm 0.2\%$ of calibrated span. The temperature assemble shall be MINCO, Omega or approved equal.

2.2.7 Reverse Rotation Switch

Provide reverse rotation switch to monitor pump shaft reverse rotation. Provide sensors with large gap hall-effect 3/8 inch $\pm 1/8$ -inch air gap, one form C 5 AMP 120 VAC (220 VAC) 50-60 Hz power source. The sensor shall be housed in a NEMA 4X cast aluminum enclosure. Provide sensor body, bracket and fasteners of 316 stainless steel. Provide sensor target as pulser disc or pulser wrap of nylon 12 with embedded magnet. The target shall be operate over a temperature range of -40 deg. to 140 deg. F. Provide potted 3-conductor shielded cable from the switch manufacturer. The cable shall be provided between the sensor and the switch housing. Provide all mounting hardware and standoffs required for installation. Provide detailed mounting instructions and installation drawings for each switch installation. Provide drawings approved by both the switch manufacturer and the manufacturer of the pump the switch is sensing rotational direction. Provide switch by Electro Switch model UDS 1000, Shinkawa electric, Predictech or approved equal.

2.3 CONTROL PANELS

2.3.1 Components

2.3.1.1 Enclosures

The enclosure for each control panel (RTU) shall conform to the requirements of NEMA 250 for the types specified. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish. Enclosures for installation in office or control rooms shall be Type NEMA 1; all other locations shall be NEMA Type 4X and shall be constructed of 316 stainless steel. Painted steel shall not be allowed for use in a corrosive environment. Enclosure shall be provided with a single, continuously hinged exterior door with print pocket, 3-point latching mechanism and key lock for NEMA 1.

Provide RTUs at; Interconnect No. 3, Little Falls, Georgetown, 2nd High Reservoir, 3rd High Reservoir East, 3rd High Reservoir West, 4th High Tower (repeater) and Dalecarlia WTP. The RTUs for; Interconnect No. 3, Little Falls and Dalecarlia WTP will not require the RTU processor and I/O but only the radio/filter, power supplies and all other peripherals shown on I-2 and as specified.

2.3.1.2 Standard Indicator Light

Indicator lights shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Lights shall be heavy duty, round and shall mount in a 0.875 inch mounting hole. Indicator lights shall be LED type and shall operate at 120 VAC or 24 VDC. Long life bulbs shall be used. Indicator light shall be provided with a legend plate labeled as shown on the drawings. Lens color shall be as indicated on the drawings. Lights shall be push to test (lamp) type.

2.3.1.3 Selector Switches

Selector switches shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Selector switches shall be heavy duty, round and shall mount in a 0.875 inch mounting hole. The number of positions shall be as indicated on the drawings. Switches shall be non-illuminated. Switches shall be rated for 600 volts, 10 amperes continuous. Selector switches shall be provided with a legend plate labeled as shown on the drawings. Where indicated or required, dual auxiliary contacts shall be provided for the automatic position to provide position sensing at the central station or workstation.

Auxiliary contacts shall be rated for 120 VAC, 1A as a minimum. Where indicated on the drawings, switches shall be key operated. All keys shall be identical.

2.3.1.4 Push Buttons

Push buttons shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Push buttons shall be heavy duty, round and shall mount in a 0.875 inch mounting hole. The number and type of contacts shall be as indicated on the drawings or required by the Sequence of Control. Push buttons shall be rated for 600 volts, 10 amperes continuous. Push buttons shall be provided with a legend plate labeled as shown on the drawings.

2.3.1.5 Relays

Relays shall comply with IEEE C37.90. Relays shall be double-pole, double-throw DPDT or as required by the Sequence of Control. Relay coil shall be 120 VAC and shall be provided with matching mounting socket. Power consumption shall not be greater than 3 watts.

2.3.1.6 Terminal Blocks

Terminal blocks shall comply with NEMA ICS 4 and UL 1059. Terminal blocks for conductors exiting control panels shall be two-way type with double terminals, one for internal wiring connections and the other for external wiring connections. Terminal blocks shall be made of bakelite or other suitable insulating material with full deep barriers between each pair of terminals. A terminal identification strip shall form part of the terminal block and each terminal shall be identified by a number in accordance with the numbering scheme on the approved wiring diagrams.

2.3.2 Panel Assembly

Control panels shall be factory assembled and shipped to the jobsite as a single unit. Panels shall be fabricated as indicated and devices shall be mounted as shown or required. Each panel shall be fabricated as a bottom-entry connection point for control system electrical power, control system wiring, and communications system wiring to other control panels and operators workstation.

2.3.3 Electrical Requirements

Each panel shall be powered by a dedicated 120 volts ac circuit, with a fuse, sized as recommended by the equipment manufacturer, and a disconnect switch located inside the panel. Wiring shall terminate inside the panel on terminal blocks.

2.3.4 Grounding

Control panel enclosures shall be equipped with a solid copper ground bus or equivalent. The ground bus shall be securely anchored to the enclosure so as to effectively ground the entire structure. Clamp-type terminals sized large enough to carry the maximum expected current shall be provided on the ground bus for grounding cables. Where a definite circuit ground is required, a single wire not less than #10 AWG shall run independently to the panel ground bus and shall be fastened to the ground bus with a bolted terminal lug. Cases of instruments, relays and other devices shall be effectively grounded through the enclosures steel structure unless otherwise indicated. Insulated wiring having a continuous rated current of not less than the circuit fuse rating shall be used for grounding. Grounding terminals of power receptacles shall be solidly grounded to the panel enclosure.

2.3.5 Convenience Outlet

A 120 volt ac, 20 AMP, ground fault interruption (GFI) type duplex convenience outlet shall be provided inside the panel. The outlet circuit shall be separate from the panel power circuit.

2.3.6 Panel Interior Light

Provide control panels with a 60 watt incandescent light with globe & guard. The light shall be operated by a manual on-off switch mounted on the interior door of the enclosure. The light shall be powered by the same circuit as the convenience outlet.

2.3.7 Sub-components

Provide protection to electronic devices from lightning and/or power surges induced in signal and power-lines entering and leaving buildings. The limiting-level shall not interfere with the normal operation of the system, and shall be below the electronic devices's surge withstanding rating. Enclose all instruments within an appropriate NEMA rated housing properly grounded to the panel in which it is mounted.

Individually connect ground wires for all surge protectors to a common, good earth ground.

Mount protectors within the instrument enclosure, a separate NEMA4X/IP66 junction box, or at the location where the signal/power lines enter the equipment enclosure. Protectors manufactured by Joslyn, Telecommunications Industries, Harger or equal.

Provide lightning and surge protection devices for analog transmitters entering and leaving buildings. Provide devices which will protect the instrument against 10 kilo-ampere surges. The device shall provide two-stage common-mode protection by means of arrestor reactor and varistor in combination and differential mode protection by means of gas arrestor, reactor and zener diode in combination. Devices as manufactured by Telematic, Harger, Entrelec or equal.

2.4 SCADA EQUIPMENT

2.4.1 RTU (Remote Terminal Unit)

Provide microprocessor based RTU. The RTU shall be provided with DI's (Digital Inputs) and AI's (Analog Inputs) as shown on the drawings. The RTU shall accept field inputs and transmit field inputs via radio, or phone to the SCADA center. The inputs shall be optically isolated and protected from surge and lightening. See drawings for RTU housing. The specifications for the RTU include:

Parameter	Condition/Description	Min	Max	Units
Temperature range	Operating	-25	+160	F
DI (up to 8)				
Safe input voltage	at 25 deg. C	-60	+60	volts
Input current	Input to common = +12V	2	3	mA
AI (up to 8)	0-30 VDC			
Impedance			1.0 ± 1%	mOHMS
Communications	RS - 232 and 485			
Surge withstand	ANSI/IEEE C37.90			
Power Consumption	Depending on operation	100	450	mW

2.4.2 Radio

Provide a connection less mesh spread spectrum radio network. The network shall include common radios that shall be both end-device and repeater type radios. The radio shall be able to store and forward information; multi-point-to-multi-point network, peer-to-peer or unsolicited polling. Provide a 902 to 928 MHz license-free spread spectrum radio. The radio shall receive inputs from new RTUs or existing Bristol Babcock remote control node or RTU 3305's. The radio shall be able to send, receive or repeat signals between radios. The radio shall incorporate a synchronous dynamic frequency hopping. The radio network shall be capable of redundant path communication. The radio receiver shall have a dynamic range of -104 to -20 dBm and a transmitter RF output of +20 dBm (100 mW) with an out-of-band spurious radiation of < - 55 dBc (1 Khz bandwidth). The radio shall meet the following environmental specifications as:

Temperature	-40 to + 60 degrees C
Humidity	95% non-condensing
Power	110 VAC 60 Hz

The radio shall be housed in the RTU enclosure or a separate NEMA 4X 316 SS enclosure. The radio shall be connected with a band-pass filter to and communicate via an omni-directional or yagi antenna. Provide the band-pass filter to reject interference from sources like pagers and cell phones.

2.4.3 Radio Modem

Provide radio modems to transmit analog signals from Georgetown Reservoir Basin 1 and 2 to the Gate House. Provide a radio modem at the Gate House to receive the transmitted signals from each basin. The transmitters shall be wired to receive the analog output from each basins existing

turbidimeter and each basins new ultrasonic level transmitter. The inputs shall be wired to the transmitter through current-to-current isolators. The radio modem (transmitter and receiver) shall:

Operating Frequency	:	2.4 GHz
Data Throughput	:	200 Kbps Minimum
Analog Inputs	:	Up to 8 (16 bit precision)
RF Modulation	:	Frequency Hopping Spread Spectrum (FHSS)
Power	:	24 VDC from 120 VAC source
Enclosure	:	Cast Aluminum NEMA 4X IP 65
I/O Connection	:	Water Tight

The transmitters shall be mounted in the existing enclosures located at each basin. The receiver shall be wall mounted in the Gate House. The outputs from the receiver shall be wired to the RTU in the Gate House. See Electrical drawings for locations.

2.4.4 Distributed Process Controller (DPC)

Provide DPC to interface between master radio receiver and plant control system. The DPC will be provided by WA to the contractor. The DPC shall be a Bristol Babcock 3335. The PCN and existing hardware are Bristol Babcock. The DPC shall collect store and forward information from the remote sites. The DPC shall provide information to any workstation on the PCN. The DPC shall include multiple communication port to connect to the radio receiver and the PCN. The Contractor shall provide a NEMA 4X 316 stainless steel enclosure to house the DPC.

2.4.5 Antenna

Provide Omni-directional and Yagi antenna. Provide antenna from a single antenna manufacturer. Provide all mounting hardware from the antenna manufacture specifically designed to mount the antenna. Mounting hardware shall be 316 SS and mounting brackets shall be cast aluminum alloy 6061-T6. Provide antenna that accept antenna cable of any length with out jumper cable. Provide antenna with flexible antenna cable lead with female N-connector. Antenna shall be provided from Decibel, RFS, Scala or approved equal.

The Omni-directional antenna shall:

Frequency Range	890 to 960 to match radios (see radio survey)
Maximum power input	300 Watts
Gain (maximum)	6 dBd (see radio survey)
Impedance	50 ohms
VSWR (Voltage Standing Wave Ratio)	1.5 : 1
Pattern	Circular
Polarization	Vertical
Grounding	Through mounting casting to earth ground
Radome	Fiberglass
Cable Connectors	N Connector

The Yagi antenna shall:

Frequency Range	896 to 960 to match radios (see radio survey)
Maximum power input	150 Watts
Gain	Adjustable (see radio survey)
Impedance	50 ohms

VSWR (Voltage Standing Wave Ratio)	1.5:1 or less
Front-to-back ratio	>20 dB
Pattern	
Polarization	Vertical
Grounding	Through mounting casting to earth ground
Construction	High strength aluminum w/ gold anodized finish
Radome	Fiberglass
Radome Cover	ABS plastic
Cable Connectors	N Connector

ANTENNA / SITE INFORMATION

SITE	ANTENNA TYPE	COMMENT / ANTENNA HT
Dalecarlia WTP	Omni-directional	Mount antenna at top of tower on 10' metal pole
Georgetown Res	Omni-directional	Mount antenna in flag pole so the antenna will clear the highest point of roof (turret) by 10'. Note - radio report states Yagi antenna but Omni should be provided to fit inside flag pole.
1st high Res	Yagi	Mount antenna on top of 30-foot utility pole w/ 5-foot metal pole attached to the utility pole. Alternate provide 50-foot flag pole.
2nd High Res	Yagi	Mount antenna on 10-foot metal pole to clear the peak of the building.
3rd High Res East	Yagi	Mount antenna on 10-foot metal pole to clear the peak of the building.
3rd High Res West	Yagi	Mount antenna on 10-foot metal pole to clear the peak of the building.
4th High Res Repeater	Omni-directional	Height will be based on final location. Should have line of site to Dalecarlia WTP, 2nd High Res and 3rd High Res East & West
Little Falls PS	Yagi	Mount antenna on 10-foot metal pole to clear the peak of the building.
Interconnect No. 3	Yagi	Mount antenna on top of 30-foot utility pole w/ 5-foot metal pole attached to the utility pole. Alternate provide 50-foot flag pole.

Provide antenna with all masts and support hardware to meet the height requirements described in the radio survey and or these specifications. Provide non-metallic or 316 SS masts and supporting hardware. Provide stealth flagpole (see flagpole specification) to conceal omni antenna at the Georgetown Reservoir site. Provide wood utility poles for sites as indicated. Provide foundation design and structural calculation for flag pole and wood utility poles stamped by a professional engineer registered

in the District of Columbia. Provide wood utility pole load calculations to prove the selected class meets the load criteria. Wood utility poles shall meet ANSI 05.1 standard.

Provide antenna with LMR - 400 Low Loss Cable as stipulated in the radio survey. Provide type N Connectors equal to MIL-C39012. Provide 3M type waterproof ColdShrink for all connectors. The cable shall connect the antenna to the radio. Provide cable reel to coil excess cable.

2.4.6 Flagpole

Provide flagpole to conceal antenna at Georgetown Reservoir. Provide flagpole to conceal omni directional antenna equal to Decibel DB586-Y. Provide flagpole from manufacturer with a minimum of 5-years experience in the production and installation of flagpoles to conceal communications antenna. The flagpole shall be approximately 60-feet tall and a minimum outside diameter of 12-inches. The flagpole shall be of steel pipe construction ASTM A53 Grade 35 3/8-inch wall thickness and shall include all internal supports and hardware to mount antenna and antenna cable. Provide flagpole with access ports for cable modifications. Provide flagpole with antenna and cabling installed and tested at factory prior to shipping. Provide flagpole and structural foundation design stamped by a professional engineer. Provide flagpole with halyard system including:

Truck	Ball bearing, non-fouling, revolving with aluminum body, double aluminum pulleys and stainless-steel sheave pins
Halyard rope	3/8-inch bronze core nylon braded
Counter weight	Required
Retaining ring	Required
Flag snaps	Stainless Steel
Halyard cleat	Stainless Steel w/ stainless steel cover to accept padlock.

Provide halyard to accept 2-each 5 x 8 flags.

Provide flagpole with factory applied corrosion protective coating. Provide built-up flagpole white multi-mil thick industrial marine grade finish. Provide finish sample and specifications with shop drawing submittal. Provide flagpole manufactured by TeleStructures, EEI, Stealth or approved equal.

2.5 CENTRAL STATION AND OPERATORS WORKSTATION EQUIPMENT

2.5.1 Central Station and Operators Workstation Computer

Provide three (3) workstations. Provide workstations in the chemical building control room to mimic the existing workstations in the pump station control room. The workstations shall be DELL 36 or equal. The workstations shall be provided as a minimum with;

2.0 GHz/512K Cache Processor

512 MB DDR 400 SDRAM Memory

Standard Keyboard

Mouse

1-40 GB Hard Drive

1-each 18GB 15K RPM Media Bay Hard Drive

16X DVDROM and CDRIN

I/O Ports for all peripherals and network connections

64 MB Video card with DVI and VGA outputs

19-inch 1901 FP monitor and AS500 sound bar

Windows 2000

Operating System and all SCADA software for monitoring, control and development.

Provide all workstations configured and located in the control room console.

The modifications to the existing Bristol Babcock System are specified in Section 13621.

2.5.2 LAN System

The local area network (LAN) shall be used to allow communication between Existing Bristol Babcock 3335, located in the control panels, and the existing workstations and printers. The LAN system configuration and requirements shall comply with the control system schematics and block diagram shown on the drawings. All LAN equipment shall fully comply with IEEE Std 8802-3 10 BASE 2 or 10 BASE T Ethernet networks. Cables and connecting hardware shall conform to the requirements of Section 16768A FIBER OPTIC DATA HIGHWAY NETWORK.

2.5.3 LAN Hubs/Routers/Switches

Provide all network hardware to connect new and existing equipment, like workstations and DPSs, to new communications networks or existing communications networks as depicted on the network and communication/SCADA diagrams. The diagrams show communications from existing remote locations through a meshed radio network to the Dalecarlia WTP. The diagrams show communications from existing Bristol processors and workstation to the new controls communication LAN. Provide Ethernet communications between the new and existing controllers and workstation and provide redundant serial communications between the processors and workstations in the pump station with the new workstations in the control center. Normal monitoring and control of the pump station and the remote SCADA sites will be from the control center located in the chemical building. The pump station control room will provide an alternate location for monitoring and control of the pump station and the remote SCADA sites. Communication between the pump station and the control center will be through the new and existing fiber links and over existing copper lines via new RS-232 multiplexors.

Network hubs, routers and/or switches shall provide communication between SCADA and DPS devices using new and existing copper and fiber network cables. Network hubs shall support protocol utilized in the LAN. Network

hubs/routers, and/or switches shall be modular and expandable from a minimum of 16 ports. Each port shall have LED indicator for network monitoring status. Network hubs shall permit online network changes without disturbing network devices. Malfunctioning network devices shall be automatically removed from service without shutting down the network.

2.6 FACTORY TEST

The control system shall be tested at the factory prior to shipment. Written notification of planned testing shall be given to the Government at least 21 days prior to testing, and in no case shall notice be given until after the Contractor has received written Government approval of the test procedures.

2.6.1 Factory Test Setup

The Contractor shall assemble and integrate the factory test setup as specified to prove that performance of the system satisfies all requirements of this project, including system communications requirements in accordance with the approved test procedures. The factory test shall take place during regular daytime working hours on weekdays. Equipment used shall be the same equipment that is to be delivered to the site. The factory test setup shall include the following:

Factory Test

Workstation	one of each type
Control panel and RTU	not less than two control panels and RTUs: at least one of each type used in the system plus at least one per DTS type
Test set	one of each type
Portable tester	one of each type
Communications circuits	one of each type and speed to be utilized in the proposed system including bridges, modems, encoder/decoders, transceivers and repeaters.
Surge protection equipment	for power, communications, I/O functions and networks
I/O functions	sufficient to demonstrate the I/O capability and system normal operation
Software	software required for proper operation of the proposed system including application programs and sequences of operation

2.6.2 Factory Test Procedure

Test procedures shall define the tests required to ensure that the system meets technical, operational, and performance requirements. The test procedures shall define location of tests, milestones for the tests, and identify simulation programs, equipment, personnel, facilities, and supplies required. The test procedures shall provide for testing all control system capabilities and functions specified and shown. The

procedures shall cover actual equipment and sequences to be used by the Contractor for the specified project and shall consist of detailed instructions for test setup, execution, and evaluation of test results. The test reports shall document results of the tests. Reports shall be delivered to the Government within 7 days after completion of each test. Surge testing need not be conducted if the Contractor can provide acceptable documented proof that such testing has been satisfactorily demonstrated to the Government with identical surge protection applied. The procedures shall include the following:

Test Procedure

Equipment	block diagram
Hardware and software	descriptions
Commands	operator commands
I/O functions	test database points with failure modes
Passwords	required for each operator access level
Each type of digital and analog point in the test database	description
Test equipment	list
Surge protection	circuit diagrams
Inputs required (I/O point values and status) and corresponding expected results of each set of input values	for each application program
Default values	for the application program inputs not implemented or provided for in the contract documents for the application programs to be tested.

2.6.3 Factory Test Report

Original copies of data produced during the factory test, including results of each demonstration procedure, shall be delivered to the Government at the conclusion of the test, prior to Government approval of the factory test. The report shall be arranged so that commands, responses, and data acquired are correlated to allow logical interpretation of the data.

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS

3.1.1 Installation

The Contractor shall install system components and appurtenances in accordance with the manufacturer's instructions and shall provide necessary interconnections, services, and adjustments required for a complete and operable system. Instrumentation and communication equipment and cable

grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. The Contractor shall adjust or replace devices not conforming to the required accuracies. Factory sealed devices shall be replaced (rather than adjusted). Wiring in exposed areas, including low voltage wiring, shall be installed in metallic raceways as specified in Division 16. Wiring in air plenum areas installed without conduit shall be plenum-rated per NFPA 70.

3.1.1.1 Isolation, Penetrations of Buildings and Clearance from Equipment

Dielectric isolation shall be provided where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exteriors shall be made watertight. Holes in concrete, brick, steel and wood walls shall be drilled or core drilled with proper equipment; conduits installed through openings shall be sealed with materials which are compatible with existing materials. Openings shall be sealed with materials which meet the requirements of NFPA 70. Installation shall provide clearance for control-system maintenance. Control system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance.

3.1.1.2 Device Mounting

Devices shall be installed in accordance with manufacturers' recommendations and as shown. Control devices to be installed in piping shall be provided with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Any deviations shall be documented by the Contractor and submitted to the Government for approval prior to mounting.

Damaged insulation shall be replaced or repaired after devices are installed to match existing work. Damaged galvanized surfaces shall be repaired by touching up with zinc paint.

3.1.1.3 Grooved Mechanical Joints

Grooves shall be prepared according to the coupling manufacturer's instructions. Grooved fittings, couplings, and grooving tools shall be the products of the same manufacturer. Pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application. Groove width and dimension of groove from end of pipe shall be measured and recorded.

3.1.2 Sequences of Operation

The Contractor shall study the operation and sequence of local equipment controls, as a part of the conditions report, and note any deviations from the described sequences of operation on the contract drawings. The Contractor shall make necessary adjustments to make the equipment operate in an optimum manner and shall fully document changes made.

3.2 INSTALLATION OF EQUIPMENT

The Contractor shall install equipment as specified, as shown and as required in the manufacturer's instructions for a complete and fully operational control system.

3.2.1 Control Panels

Control panels shall be located as indicated on the drawings. Devices located in the control panels shall be as shown on the drawings or as needed to provide the indicated control sequences.

3.2.2 Flow Measuring Device

Fluid flow instruments shall be installed in accordance with ASME FM, unless otherwise indicated in the specification. The minimum straight unobstructed piping for the flowmeter installation shall be 10.0 pipe diameters upstream and 5.0 pipe diameters downstream or as specifically shown on the Contract Drawings. Meters for gases and vapors shall be installed in vertical piping, and meters for liquids shall be installed in horizontal piping, unless otherwise recommended by the manufacturer or indicated in the specifications.

3.2.2.1 Flow Switch

Flow switches shall be installed in such a manner as to minimize disturbance of the flow of fluid while maintaining reliable operation of the switch.

3.2.2.2 Magnetic Flowmeter

Meter shall be installed in vertical piping so that the flow tube remains full of the process fluid under all operating conditions. A minimum of five pipe diameters straight run upstream of the flowmeter and two pipe diameters straight run downstream of the flowmeter shall be provided.

3.2.3 Level Instruments

3.2.3.1 Capacitance Liquid Level Sensors

The sensing probes shall be located close to, and parallel with, the tank or sump wall.

3.2.3.2 Conductivity Switch

Level switches shall be installed vertically and in accordance with the manufacturer's instructions. Switches shall be accessible for maintenance and calibration. In applications where switches cannot be directly mounted to a tank by the threaded or flanged connection, a mounting bracket shall be provided for connection to the inside tank wall, maintaining the minimum recommended distance from the tank fill opening.

3.2.3.3 Float Switches

Switches shall be mounted in accordance with manufacturer's published instructions. Procedures shall be those used for equipment in hazardous locations.

3.2.4 Pressure Instruments

Pressure sensors and pressure transducers shall be verified by calibration. All pressure taps shall incorporate appropriate snubbers. Pressure sensors and pressure switches shall have valves for isolation, venting, and taps for calibration. Pressure switches and pressure transducers installed on liquid or steam lines shall have drains. Pressure transducers,

differential pressure sensors and differential pressure switches shall have nulling valves. Pressure switches shall be adjusted to the proper setpoint and shall be verified by calibration. Switch contact ratings and duty shall be selected for the application.

3.2.5 Temperature Instrument Installation

3.2.5.1 RTD

RTD shall be installed in a thermowell or as specified in Part 2 of these specifications. Thermowells shall be filled with conductive heat transfer fluid prior to installation of the RTD in the thermowell. RTD assemblies shall be readily accessible and installed to allow easy replacement.

3.2.6 Instrument Shelters

Instrument shelters shall be installed in the location shown with the bottom 4.0 feet above the supporting surface using legs and secured rigidly to minimize vibrations from winds. Instrument shelters shall be oriented with door facing North. Instruments located in shelters shall be mounted in the 3-dimensional center of the open space of the shelter.

3.2.7 Electric Power Devices

3.2.7.1 Potential and Current Transformers

The Contractor shall install potential and current transformers in enclosures unless otherwise shown. Current transformer leads shall be shorted when they are not connected to the measurement circuits.

3.2.7.2 Transducers

Transducers shall be wired in accordance with the manufacturer's instructions, and installed in enclosures.

3.2.7.3 Current Sensing Relays and Current Transducers for Motors

When used to sense meter/fan/pump status, current sensing relays shall be used for applications under 5 hp. Applications over 5 hp shall use a current transducer.

3.2.8 Output Devices

Output devices (transducers, relays, contactors, or other devices) which are not an integral part of the control panel, shall be mounted in an enclosure mounted adjacent to the control panel, unless otherwise shown. Where H-O-A and/or override switches on the drawings or required by the control sequence, the switches shall be installed so that the control system controls the function through the automatic position and other controls work through the hand position.

3.2.9 Enclosures

All enclosure penetrations shall be from the bottom of the enclosure, and shall be sealed to preclude entry of water using a silicone rubber sealant.

3.2.10 Transformers

Transformers for control voltages below 120 VAC shall be fed from the

nearest power panel or motor control center, using circuits provided for the purpose. The Contractor shall provide a disconnect switch on the primary side and a fuse on the secondary side. Transformers shall be enclosed in a steel cabinet with conduit connections.

3.3 WIRE, CABLE AND CONNECTING HARDWARE

3.3.1 LAN Cables and Connecting Hardware

LAN cables and connecting hardware shall be installed in accordance with Section 16768A.

3.3.2 Metering and Sensor Wiring

Metering and sensor wiring shall be installed in accordance with the requirements of ANSI C12.1, NFPA 70, and Division 16 of these specifications.

3.3.2.1 Power Line Surge Protection

Control panels shall be protected from power line surges. Protection shall meet the requirements of IEEE C62.41. Fuses shall not be used for surge protection.

3.3.2.2 Sensor and Control Wiring Surge Protection

Digital and analog inputs shall be protected against surges induced on control and sensor wiring. Digital and analog outputs shall be protected against surges induced on control and sensor wiring installed outdoors and as shown. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both the normal and common mode using the following two waveforms: The first waveform shall be 10 microseconds by 1000 microseconds with a peak voltage of 1500 volts and a peak current of 60 amperes. The second waveform shall be 8 microseconds by 20 microseconds with a peak voltage of 1000 volts and a peak current of 500 amperes.

3.4 SOFTWARE INSTALLATION

The Contractor shall for all RTU's and Radios, load software required for an operational control system, including databases (for points specified and shown), operational parameters, and system, command, and application programs. The Contractor shall adjust, tune, debug, and commission all software and parameters for controlled systems to assure proper operation in accordance with the sequences of operation and database tables.

3.5 FIELD TESTING AND ADJUSTING EQUIPMENT

The Contractor shall provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Government will witness the PVT, and written permission shall be obtained from the Government before proceeding with the testing. Original copies of data produced, including results of each test procedure, during PVT shall be turned over to the Government at the conclusion of each phase of testing prior to Government approval of the test. The test procedures shall cover actual equipment and functions specified for the project.

3.5.1 Testing, Adjusting and Commissioning

After successful completion of the factory test as specified, the

Contractor will be authorized to proceed with the installation of the system equipment, hardware, and software. Once the installation has been completed, the Contractor shall test, adjust, and commission each control loop and system in accordance with NIST SP 250 and shall verify proper operation of each item in the sequences of operation, including hardware and software. The Contractor shall calibrate field equipment, including control devices, adjust control parameters and logic (virtual) points including control loop setpoints, gain constants, constraints, and verify data communications before the system is placed online. Testing of ground rods. Ground rods installed by the Contractor shall be tested as specified in IEEE Std 142. The Contractor shall calibrate each instrumentation device connected to the control system control network by making a comparison between the reading at the device and the display at the workstation, using a standard at least twice as accurate as the device to be calibrated. The Contractor shall check each control point within the control system control network by making a comparison between the control command at the central station and field-controlled device. The Contractor shall deliver trend logs/graphs of all points showing to the Government that stable control has been achieved. Points on common systems shall be trended simultaneously. One log shall be provided showing concurrent samples taken once a minute for a total of 4 hours. One log shall be provided showing concurrent samples taken once every 30 minutes, for a total of 24 hours. The Contractor shall verify operation of systems in the specified failure modes upon Control system network failure or loss of power, and verify that systems return to control system control automatically upon a resumption of control system network operation or return of power. The Contractor shall deliver a report describing results of functional tests, diagnostics, calibrations and commissioning procedures including written certification to the Government that the installed complete system has been calibrated, tested, adjusted and commissioned and is ready to begin the PVT. The report shall also include a copy of the approved PVT procedure.

3.5.2 Performance Verification Test (PVT)

The Contractor shall prepare test procedures for the PVT. The test procedure shall describe all tests to be performed and other pertinent information such as specialized test equipment required and the length of the PVT. The test procedures shall explain, in detail, step-by-step actions and the expected results, to demonstrate compliance with all the requirements of the drawings and this specification. The test procedure shall be site specific and based on the inputs and outputs, required calculated points and the sequence of control. The Contractor shall demonstrate that the completed Control system complies with the contract requirements. All physical and functional requirements of the project including communication requirements shall be demonstrated and shown. The Contractor shall demonstrate that each system operates as required in the sequence of operation. The PVT as specified shall not be started until after receipt by the Contractor of written permission by the Government, based on the Contractor's written report including certification of successful completion of testing, adjusting and commissioning as specified, and upon successful completion of training as specified. Upon successful completion of the PVT, the Contractor shall deliver test reports and other documentation as specified to the Government.

3.5.3 Endurance Test

The Contractor shall use the endurance test to demonstrate the overall system reliability of the completed system. The endurance test shall be

conducted in phases. The endurance test shall not be started until the Government notifies the Contractor in writing that the PVT is satisfactorily completed, training as specified has been completed, outstanding deficiencies have been satisfactorily corrected, and that the Contractor has permission to start the endurance test. The Contractor shall provide an operator to man the system 8 hours per day during daytime operations, including weekends and holidays, during Phase I endurance testing, in addition to any Government personnel that may be made available. The Government may terminate testing at any time when the system fails to perform as specified. Upon termination of testing by the Government or by the Contractor, the Contractor shall commence an assessment period as described for Phase II. Upon successful completion of the endurance test, the Contractor shall deliver test reports and other documentation, as specified, to the Government prior to acceptance of the system.

3.5.3.1 Phase I (Testing)

The test shall be conducted 24 hours per day, 7 days per week, for 7 consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized by the Government in writing.

3.5.3.2 Phase II (Assessment)

After the conclusion of Phase I, the Contractor shall identify failures, determine causes of failures, repair failures, and deliver a written report to the Government. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which testing should be resumed. After delivering the written report, the Contractor shall convene a test review meeting at the job site to present the results and recommendations to the Government. The meeting shall not be scheduled earlier than 5 business days after receipt of the report by the Government. As a part of this test review meeting, the Contractor shall demonstrate that failures have been corrected by performing appropriate portions of the performance verification test. The Government reserves the right to cancel the test review meeting if no failures or deficiencies occur during the Phase I testing. If the Government chooses to do so, the Contractor will be notified in writing. Based on the Contractor's report and the test review meeting, the Government will determine if retesting is necessary and the restart point. The Government reserves the right to require that the Phase I test be totally or partially rerun. The Contractor shall not commence any required retesting until after receipt of written notification by the Government. After the conclusion of any retesting which the Government may require, the Phase II assessment shall be repeated as if Phase I had just been completed.

3.5.3.3 Exclusions

The Contractor will not be held responsible for failures resulting from the following: Outage of the main power supply in excess of the capability of any backup power source, provided that the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the control system performed as specified. Failure of a Government furnished communications link, provided that the control system automatically and correctly operates in the stand-alone mode as specified, and that the failure was not due to Contractor furnished equipment, installation, or software. Failure of existing Government owned equipment, provided that the failure was not due to Contractor furnished equipment,

installation, or software.

3.6 MANUFACTURER'S FIELD SERVICES

The Contractor shall obtain the services of a manufacturer's representative experienced in the installation, adjustment, and operation of the equipment specified. The representative shall supervise the installing, adjusting, and testing of the equipment.

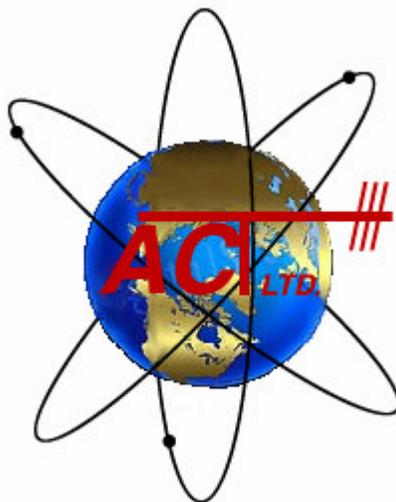
3.7 INSTRUMENTATION AND CONTROL SYSTEM

Control drawings, with corresponding CADD files, shall be provided for equipment furnished and for interfaces to equipment at each respective equipment location. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation and procedures for safely starting and stopping the system manually shall be prepared in typed form, reproducible, with corresponding word processor files and posted beside the diagrams. Diagrams and instructions shall be submitted prior to posting.

3.8 FIELD TRAINING

Training oriented to the specific system shall be provided for specification 01735.

-- End of Section --



AMERICAN CONTROL TECHNOLOGIES, LTD

**RF PATH SURVEY
900 MHz Spread Spectrum
Delecarlia, DC**

3/18/2001

**American Control Technologies, Ltd.
1573 North Main Street
Fall River, MA 02720**

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Glossary of Terms

Line of Sight

Radio waves, like light and other forms of electromagnetic radiation, travel in straight lines through the unobstructed vacuum of space. It is convenient to think of light waves traveling in straight lines through the Earth's atmosphere as well, but this is not precisely accurate. Small variations in the temperature, pressure, and water vapor content of the atmosphere slightly bend, or refract, light and radio waves- usually toward the Earth's surface. Even so, the visual line-of-sight distance to the horizon can be approximated as a straight line, assuming normal atmospheric conditions and a smooth spherical Earth. Line of Sight zones are represented by the straight line (top line) on the vertical ComStudy™ graph in each site section.

$$d_1 = \sqrt{12.75h}$$

where

d_1 = visual distance to the horizon, kilometers

h = elevation of the observer, meters

Free-Space and Atmospheric Losses

All radio signals undergo losses, or attenuation, as they travel through space, whether it is in the near vacuum of extraterrestrial space or within the Earth's atmosphere. In addition, atmospheric gasses, rain, snow, hail, fog, smog, and clouds may attenuate certain UHF and microwaves further. Attenuation considerations rarely limit high-frequency communications (3 to 30 MHz), and all but free-space losses can be ignored for most modes of terrestrial propagation in the VHF range (30 to 300 MHz). In the UHF range and higher, both atmospheric and free-space losses must be considered in deriving a realistic estimate of received signal strength in terrestrial paths.

Free-Space Losses

Radio signals radiated by an ideal isotropic antenna (one that radiates equally well in all directions) weaken with the square of the distance the signals travel through unobstructed space. This exponential attenuation with distance is caused by the gradual dispersal of energy in all directions from its source. Attenuation also increases with frequency, because the physical size of a theoretical isotropic antenna varies directly with wavelength. As wavelength decreases, the isotropic antenna becomes smaller, and it absorbs proportionately less radio energy from space. Free-space attenuation, measured as the ratio of received power to transmitted power, at a given frequency and distance by isotropic antennas, is given by

$$\frac{P_r}{P_t} = \left(\frac{300}{4\pi fd} \right)^2$$

Where:

P_r = power received by isotropic antenna, watts

P_t = transmitted power from an isotropic antenna, watts

f = frequency, MHz

d = distance in meters between transmitter and receiver

The basic equation for free-space path loss is usually written in a more convenient form that expresses attenuation in terms of decibel (dB) loss.

$$L_{fs} = 32.45 + 20 \log d + 20 \log f$$

Where:

L_{fs} = path loss, dB

d = distance, kilometers

f = frequency, MHz

Path Loss

Path loss is the mathematical calculation from a predefined formula. The formula takes into consideration the Effective Earth Radius Factor and the Free Space and Atmospheric Losses. The formula does not account for any obstacle, interference, or weather losses. For most distances less than 5 miles the path loss calculation is usually not effective. This is especially true for stations with good line of sight.

$$PL = 117 + 20 \log 10 * f \text{ MHz} - 20 \log 10 * H_t * H_r + 40 \log 10 D$$

Where:

PL = path loss in dBm

117 is a constant

f = operating frequency

H_t = height of transmitter

H_r = height of receiver

D = distance between antennas in miles

Path Fade Margin

Fading reduces path margin. Fading is a random increase in path loss caused by atmospheric conditions, or abnormal propagation. When these unfavorable conditions occur path loss may increase by 10-30 dB for very short periods of time. Therefore, it is important to design the system to compensate for fading. The fade margin is the margin of signal strength you have available to overcome any of these conditions before you start losing effective communications.

$$\text{Path Margin} = \text{Power out} - \text{Rx sensitivity} - \text{cable loss} + \text{antenna gain}$$

Rain Attenuation

Absorption by rain increases path losses significantly at 10 GHz and higher. A 3.3-GHz signal passing through an intense thunderstorm region 20 km wide with rainfall of 25 millimeters per hour (mm/hr) experiences less than 0.2-dB loss. A 10-GHz signal traversing the same thunderstorm would lose 13 dB. Rain attenuation increases with frequency and the total amount of water suspended in droplet form at any moment. The amount of water in the path is a function of rainfall intensity and the geographic extent of the rain. The larger the area of rain along a radio path, the greater the losses. Normally, rain covers only a portion of a total path length. Attenuation caused by rainfall can be calculated from available data, as with oxygen and water vapor.

Fresnel Zone Clearance

Objects near the direct the radio line of sight may act as diffraction points and introduce as much as 6 dB additional attenuation to the received signal. If the object is large and rounded on top, attenuation can be 20 dB or greater. In order to avoid diffraction losses, all objects (peaks of hills and mountains, as well as trees, power lines, buildings, etc) must lie outside the first 0.6 Fresnel (F0.6) clearance zone. Fresnel Zones are not very relevant to sights that are within 5 miles of each other. Fresnel Zones are represented by the curved line (lower line) on the vertical ComStudy™ graph in each site section.

RSSI (Received Signal Strength Indication)

This is the actual receiver sensitivity obtained by the physical survey using the noted equipment.

Decibel (dB)

Decibel is a measure of the ratio between two signal levels. Frequently used to express the gain (or loss) of a system.

Point-Multipoint System

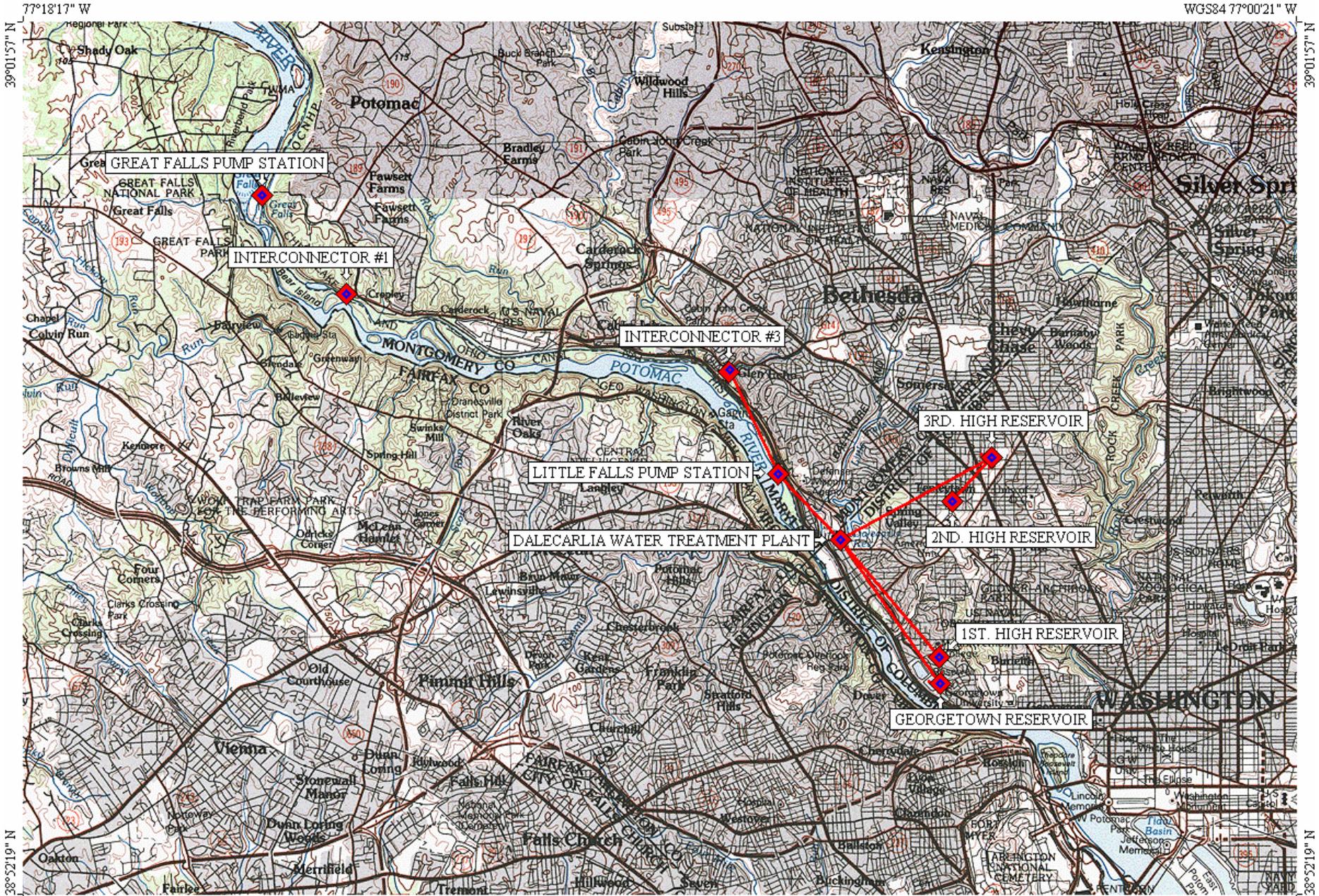
A radio communications network or system designed with a central control station that exchanges data with a number of remote locations equipped with terminal equipment.

Spread Spectrum

The term "Spread Spectrum" (SS) describes a communications technique whereby a radio frequency signal is modulated (spread) a second time so as to generate an expanded bandwidth wideband signal. Spread Spectrum is usually used for data transmission. The two most popular types of Spread Spectrum modes are Frequency Hopping and Direct Sequence.

Frequency Hopping

Frequency Hopping Spread Spectrum involves the application of a pseudorandom code, which causes the transmitter to periodically "hop" or jump to a new frequency, transmit information on the frequency for a defined period of time, then hop to the next frequency and repeat the process. In order for the receiver to recover the transmitted information, it must hop to the same frequencies as the transmitter. Thus, the pseudorandom code and some synchronization information must be known at the receive end of the link. Frequency Hopping Spread Spectrum usually uses narrow band transmit and receive techniques, thus providing long distance communications with excellent noise immunity and interference rejection capabilities.



77°18'17" W
 39°01'57" N
 38°52'19" N
 77°18'17" W

WGS84 77°00'21" W
 39°01'57" N
 38°52'19" N
 WGS84 77°00'21" W

MN ↑ TN
 10%

0 1 2 3 4 miles
 0 1 2 3 4 5 6 7 km
 Printed from TOPO! ©1998 Wildflower Productions (www.topo.com)

Recommended antenna location.



DALECARLIA WATER TREATMENT PLANT AND BOOSTER PUMP STATION

The Dalecarlia Water Treatment Plant consists of an open reservoir with a Master Control building, a 90 ft. office building, and a Booster Pump station located on the other side of Macarthur Boulevard. Because it is the highest accessible location in the plant, all tests were conducted utilizing a 5 dB 900 MHz Omni-directional antenna and radio positioned on top of the 90 ft. office building. This radio was set up to act as a repeater for the system, passing data between the remotes and the Master.

RECOMMENDATIONS:

The Master Control building should be outfitted with its own Metricom Utilinet 900 MHz spread spectrum radio, LMR 400 low loss cable and 6 dB Yagi directional antenna. For the repeater on top of the 90 ft. office building utilize the Metricom Utilinet Series II Integrated WanGate 900 MHz spread spectrum radio with the mesh networking capability. The Metricom radio is the only radio with the ability to hop through multiple paths allowing for path redundancy and to insure an adequate path to all remote sites. For all sites it is recommended that 900 MHz tuned cavity band pass filters be utilized in this application due to expected future cell site transmitter interference. A tuned cavity band pass filter is a device, which can be physically tuned to eliminate interference outside the operating frequency bandwidth of the radio. Install a 10-foot metal pole to the top of the 90 ft. office building. Mount a 6 dB omni-directional antenna to the pole with LMR 400 low loss cable.