

US Army Corps
of Engineers
Baltimore District

CONSTRUCTION SPECIFICATIONS

ROUTE 405/442 SANITARY SEWER PROJECT

LYCOMING COUNTY, PENNSYLVANIA

INVITATION FOR BIDS **W912DR-04-B-0019**

CONTRACT NO.

DATE **OCT 06, 2004**

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SECTION 01000

ADMINISTRATIVE REQUIREMENTS

01/01

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.

Proof of full payment.

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-05 Design Data

Progress Schedule; G AR.

A schedule that shows the manner in which the Contractor intends to prosecute the work.

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 (AUG. 1999)

The Contractor, shall within five days or as otherwise determined by the Contracting Officer, after date of commencement of work, submit for approval a practicable progress schedule showing the manner in which he intends to prosecute the work. Contractor prepared form shall contain the same information as shown on the attached NADB Form 1153 ("Physical Construction Progress Chart" (CENAB-CO-E)

1.3 PROGRESS SCHEDULING AND REPORTING (DEC 1998)

1.3.1 Practical Progress Schedule

Not used.

1.3.2 Software Package

Not used.

1.3.3 Additional Scheduling Requirements

Not used.

1.3.4 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 \$1000 shall be assessed for this activity.

1.4 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)

1.5 IDENTIFICATION OF EMPLOYEES (OCT 1983)

Not used.

1.6 PURCHASE ORDER: (SEP 1975)

One readable copy of all purchase orders 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)

1.7 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 practice of leasing the same or similar equipment to unaffiliated leases.

(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)

1.8 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)

1.9 O AND M DATA: (JUL 1979)

The requirements for furnishing operating 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)

1.10 FACILITY SECURITY CLEARANCE:

Not used.

1.11 HOT-WORK PERMIT

Not used.

1.12 PERFORMANCE AND PAYMENT BOND REIMBURSEMENT: (MAY 1983)

Not used.

1.13 MEASUREMENT AND PAYMENT

Not used.

1.14 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)

1.15 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" (203.2 mm x 254 mm) 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)

1.16 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)

1.17 PERMITS

The permits listed below have been obtained by the Government or the non-Federal sponsor or are in the approval process and may require additional action by the Contractor to become complete. A copy of each permit is included at the end of this section. The Contractor shall abide by all permit requirements.

- a. NPDES and Erosion and Sediment Control Plan: The NPDES Permit Application and Erosion and Sediment Control Plan was reviewed and approved by the Lycoming County Conservation District. Erosion and Sediment control measures are shown on plan sheets ES-1 and ES-2. A copy of the permit and attachments is included at the end of this specification section. The Contractor must complete the minimum of 30-days prior to the start of construction. The Contractor is also responsible for the completion of the Notice of Termination (NOT) form when construction activities have ceased and final stabilization has been achieved. The Contractor shall complete the NOT, obtain required co-permittee signatures and submit the completed form to the Lycoming County Conservation District, 542 County Farm Road, Suite 202, Montoursville PA 17754.
- b. The DEP Water Quality Management Permit was issued by the Pennsylvania Department of Environmental Protection on August 19, 2002. A copy of the permit is included at the end of this specification section.
- c. A DEP General Permit for minor stream crossings was issued by the Pennsylvania Department of Environmental Protection on August 15, 2002. A copy of the permit is included at the end of this specification section. The contractor is responsible for adhering to the conditions established in the permit.
- d. PENNDOT Highway Occupancy Permit (HOP) - Application for HOP has been submitted. Copy of the permit and conditions set forth in the permit will be included in this section upon receipt of permit from PENNDOT.

2 PRODUCTS

NOT APPLICABLE

3 EXECUTION

NOT APPLICABLE

ATTACHMENTS:

NADB Form 1153 ("Physical Construction Progress Chart")

SECTION 01050

JOB CONDITIONS

01/01

1 GENERAL

1.1 LAYOUT OF WORK

LAYOUT OF WORK: (APR 1965 OCE)

The Government has established bench marks and horizontal control points at the site of the work. These are described and indicated on contract drawings.

From these control points the Contractor shall lay out the work by establishing all lines and grades at the site necessary to control the work and shall be responsible for all measurements that may be required for the execution of the work to the location and limit marks prescribed in the specifications or on the contract drawings. The Contractor shall establish and maintain at the site of the work as a minimum requisite the following horizontal and vertical controls:

The contractor shall preserve and maintain those control points provided by the government. Contractor shall be provided coordinate information to lay out the work. Contractor is responsible to establish and maintain any temporary controls deemed necessary by him for ongoing control of the work.

The above are minimum requirements and the Contractor shall place and establish such additional stakes and markers as may be necessary for control and guidance of his construction operations. All survey data shall be recorded in accordance with standard and approved methods. All field notes, sketches, recordings and computations made by the Contractor in establishing above horizontal and vertical control points shall be available at all times during the progress of the work for ready examination by the Contracting Officer or his duly authorized representative.

The Contractor shall furnish, at his own expense, all such stakes, spikes, steel pins, templates, platforms, equipment tools and material and all labor as may be required in laying out any part of the work from the control points established by the Government. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other markers established by him until authorized to remove them. If any of the control points established at the site by the Government are destroyed by or through the negligence of the Contractor prior to their authorized removal, they may be replaced by the Contracting Officer, and the expense of replacement will be deducted from any amount due or which may become due the Contractor. The Contracting Officer may require that work be suspended at any time when horizontal and vertical control points established at the site by the Contractor are not reasonably adequate to permit checking the work. Such suspension will be withdrawn upon proper replacement of the control points. (ECI 7-672.2)

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 Explorations

No subsurface exploration was completed during the design of this project.

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 AR.

Prior approval for service/utility interruptions.

When changes and/or relocations are required.

Checklist; G AR

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

Interruption of railroad traffic.

A form that is used for statistical information purposes.

Survey Data; G AR

The establishing of bench marks and horizontal control points.

Quantity Surveys

The furnishing of all original field notes and all other records relating to the survey or to the layout of the work.

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:

c. Nature of Utility (Gas, L.P. or H.P., Water, Etc.)

d. Size of line and location of shutoff.

e. Buildings and services affected.

f. Hours and date of shutoff.

g. Estimated length of time service will be interrupted.

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

i. 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.

j. 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.

k. 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)

1.4.3 Alterations to Utilities: (AUG 1968)

Not used.

1.4.4 Utility Markings

The Contractor shall contact the installation/DPW and the One-Call Service, a minimum of 14 days and 48 hours, respectively, prior to any excavation, the Post DPW and Miss Utility 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 0.6096 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 POST/BASE REGULATIONS

Not used.

1.7 MAINTENANCE OF ACCESS: (DEC 1975)

The Contractor shall not block passage through sidewalks, roads, alleys or other entranceways adjacent to buildings; during performance of work under this contract. All existing equipment, materials and debris removed during the work that are not to be reinstalled shall be removed daily by the Contractor. (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 equipment 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 personnel by installing safety rails and/or barricades as applicable to prevent injury from unauthorized entry 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 ORDER OF WORK AND COORDINATION WITH OTHER CONTRACTORS (FEB 1979)

Not used.

1.11 SALVAGE MATERIAL AND EQUIPMENT (OCT 1983)

Not used.

1.12 CONTRACTOR USE OF HEATING PLANT: (1968) (MOD 1975)

Not used.

1.13 MAINTENANCE OF UTILITIES: (FEB 1985)

Not used.

1.14 ASBESTOS HANDLING AND REMOVAL (FEB 85)

Not used.

1.15 ASBESTOS (JAN 1985 REV NOV 1993)

Not used.

1.16 ASBESTOS (NOV 1993)

Not used.

1.17 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

Not used.

1.17.1 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.

1.17.2 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
19	11	9	9	9	9	6	7	5	6	6	13

1.17.3 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)".

1.18 WORK IN QUARANTINED AREA: (MAY 1968)

Not used.

1.19 AIRFIELD SAFETY PRECAUTIONS (DEC 1991)

Not used.

1.20 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 08:00 am to 4:30 pm.

1.21 LIMITS OF WORK AREAS

The limits of work areas as shown on the drawings are necessarily approximate. In case of doubt as to the actual limits of any work area, determination as to the actual limits will be made by the Contracting Officer.

1.22 QUANTITY SURVEYS:

Quantity surveys shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.

The Contractor shall conduct the original and final surveys and surveys for any periods for which progress payments are requested. All these surveys shall be conducted under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance. The Government shall make such computations as are necessary to determine the quantities of work performed or finally in place. The Contractor shall make the computations based on the surveys for any periods for which progress payments are requested.

Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Contracting Officer, who shall use them as necessary to determine the amount of progress payments. The Contractor shall retain copies of all such material furnished to the Contracting Officer. (FAR 52.236.16 APR 1984)

1.23 AGGREGATE SOURCES (1983 MAY OCE)

Not used.

1.24 AGGREGATE SOURCES (1965 APR OCE)

Not used.

1.25 DAMAGE TO WORK (1966 MAR OCE)

The responsibility for damage to any part of the permanent work shall be as set forth in the "Permits and Responsibilities" clause of the Contract Clauses. However, if, in the judgment of the Contracting Officer, any part of the permanent work performed by the Contractor is damaged by flood or earthquake which damage is not due to the failure of the Contractor to take reasonable precautions or to exercise sound engineering and construction practices in the conduct of the work, the Contractor will make the repairs as ordered by the Contracting Officer and full compensation for such repairs will be made at the applicable contract unit or lump sum prices as fixed and established in the contract. If, in the opinion of the Contracting Officer, there are no contract unit or lump sum prices applicable to any part of such work an equitable adjustment pursuant to the "Changes" clauses of the Contract Clauses, will be made as full compensation for the repairs of that part of the permanent work for which there are no applicable contract unit or lump sum prices. Except as herein provided, damage to all work (including temporary construction), utilities, materials, equipment and plant shall be repaired to the satisfaction of the Contracting Officer at the Contractor's expense, regardless of the cause of such damage. (CENAB)

1.26 RECORDING AND PRESERVING ARCHEOLOGICAL FINDS:

Not used.

1.27 WORK ADJACENT TO RAILROAD PROPERTY:

Not used.

1.28 ENVIRONMENTAL LITIGATION (1974 NOV OCE)

If the performance of all or any part of the work is suspended, delayed, or interrupted due to an order of a court of competent jurisdiction as a result of environmental litigation, as defined below, the Contracting Officer, at the request of the Contractor, shall determine whether the order is due in any part to the acts or omissions of the Contractor or a Subcontractor at any tier not required by the terms of this contract. If it is determined that the order is not due in any part to acts or omissions of the Contractor or a Subcontractor at any tier other than as required by the terms of this contract, such suspension, delay, or interruption shall be considered as if ordered by the Contracting Officer in the administration of this contract under the terms of the "Suspension of Work" clause of the Contract Clauses. The period of such suspension, delay or interruption shall be considered unreasonable, and an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) as provided in that clause, subject to all the provisions thereof.

The term "environmental litigation", as used herein, means a lawsuit alleging that the work will have an adverse effect on the environment or that the Government has not duly considered, either substantively or procedurally, the effect of the work on the environment. (CENAB)

1.29 MEASUREMENT AND PAYMENT

No separate measurement and payment will be made for the work performed in this Section 01050, JOB CONDITIONS, specified herein; and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor, and shall be included in the overall cost of the work. (CENAB)

2 PRODUCTS

NOT APPLICABLE

3 EXECUTION

NOT APPLICABLE

ATTACHMENT

RISK ASSESSMENT CHECKLIST

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

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 (03 Nov 2003) Safety - 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 AR.

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 Reports

Activity Phase Hazard Analysis Plan; G AR.

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.

2 PRODUCT NOT APPLICABLE

3 EXECUTION NOT APPLICABLE

SECTION 01070

CUTTING, PATCHING AND REPAIRING
01/01

1 GENERAL

1.1 DESCRIPTION

This section pertains to the provision of all cutting, removing, replacing, patching, repairing, restoration, refinishing and similar type work as necessary to existing work scheduled to remain and to new work required to be cut or uncovered. All existing facilities damaged as a result of the construction activities shall be restored to a condition equivalent to that prior to the start of work, except where otherwise shown or specified.

1.2 WORK EXECUTION

Extent of work includes uncovering work to provide for installation of ill-timed work, removal and replacement of defective work or work that does not conform to the contract documents, installation of new work to be installed in existing construction, and as necessary to make several parts fit.

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

Procedures; G AR.

The accomplishment of cutting, patching, and repairing of the work.

2 PRODUCTS

2.1 MATERIALS

Materials for replacement, repairing, patching, restoration, and similar type work shall conform to applicable sections of the specifications for new materials or work. Where existing materials and/or installations are not covered by the specifications, such materials shall match existing. All excess materials resulting from cutting and removal work shall be removed from the job site.

3 EXECUTION

3.1 INSPECTION AND PREPARATION

3.1.1 Inspection of Conditions of Work

Inspect all existing conditions of work, for possible movement or damage during cutting or uncovering procedures. After uncovering work, inspect

conditions affecting installation of new products. Do not proceed with any further cutting, patching or repairing work if defects are observed; or if any unsafe condition exists.

3.1.2 Preparation of the Work Site

Prior to cutting or uncovering work, provide all shoring, bracing and supports as required to maintain the structural integrity of the project. Prior to restoration work, properly prepare existing surfaces to receive new materials such as to provide a proper bond or joining.

3.2 CUTTING AND DRILLING

Contractor shall do all cutting and drilling of existing walls, partitions, ceilings, floors, etc., as necessary for installation of the new work as shown, including cutting of holes and other openings for new plumbing, mechanical and electrical work. Cutting shall be performed by hand or small power tools; holes and slots cut neat and to size required, with minimum disturbance of adjacent work; cut holes in concrete slabs for pipes and conduit with core drills of proper sizes. Openings shall be covered temporarily when not in use and patched as soon as work is installed.

3.3 PATCHING AND REPAIRS

3.3.1 Performance of Work

Existing work shall be cut, altered, removed, temporarily removed and replaced, or relocated as required for the performance of the work indicated on the drawings. Work remaining in place that is damaged or defaced by reason of alteration or demolition shall be restored to a condition equivalent to that prior to the start of work. Contractor shall be responsible for coordinating all patching and repairing involving the various trades, whether or not specifically mentioned under the respective sections.

3.3.2 Alterations

Where alterations or removals exposes damaged or unfinished surfaces or materials, such surfaces or materials shall be refinished or replaced as necessary to make continuous areas uniform. Where new work by any trade occurs in an existing finished area the entire wall or ceiling surface in which such work occurs shall be refinished. Where such new work occurs in an existing unfinished area, the work shall be done to render the new work inconspicuous.

3.3.3 Utility Removal

Where utilities are removed, relocated, or abandoned, they shall be capped, valved or plugged to make a complete and working installation as required. Resulting holes and damaged surfaces shall be properly patched to match adjacent undisturbed surfaces or prepared to receive new finish as applicable.

3.3.4 Restoration of Existing Surfaces

All surfaces affected by patching and repairing work shall be restored to match existing adjacent surfaces. Repainting of affected areas or surfaces shall match color and shade of existing painted surfaces.

3.4 PROCEDURES

3.4.1 Procedures

The procedures proposed for the accomplishment of cutting, patching, and repairing work shall be submitted when such work affects:

- a. Work of Government employees or Contractors working under separate contract.
- b. The structural value of or structural integrity of any element of the project.
- c. Integrity of effectiveness of weather-exposed or moisture-resistant elements or systems.
- d. Efficiency and operational life, maintenance or safety of operational elements.
- e. Visual qualities of sight-exposed elements.

3.4.2 Submittals

- a. Identification of the project.
- b. Description of affected work.
- c. The necessity for cutting, patching or alteration.
- d. The affect on work of the Government or any separate Contractor.
- e. The affect on the structural or weather proof integrity of the project.
- f. Description of proposed work:
 1. Scope of cutting, patching, alteration and repairing.
 2. Trades who will execute the work.
 3. Products proposed to be used.
 4. Schedule of work.
- g. Alternatives to cutting, patching and repairing.

3.5 MEASUREMENT AND PAYMENT

Measurement and payment for cutting, patching and repairing will be in accordance with the pay items provided in the contract documents.

SECTION 01200

WARRANTY REQUIREMENT
01/01

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 \$20,000. 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

GRINDER PUMP SYSTEMS

The contractor is responsible for responding to warranty issues on grinder pump installation within 24-hours of the reported problem. Contractor shall provide to the Authority a 24-hour emergency contact telephone number for this purpose.

2 PRODUCTS - NOT APPLICABLE

3 EXECUTION - NOT APPLICABLE

SECTION 01312A

QUALITY CONTROL SYSTEM (QCS)

08/01

PART 1 GENERAL

1.1 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01320, PROJECT SCHEDULE, Section 01330, SUBMITTAL PROCEDURES, and Section 01451, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on 3-1/2 inch high-density diskettes or CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.3 SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

Hardware

IBM-compatible PC with 200 MHz Pentium or higher processor
32+ MB RAM
4 GB hard drive disk space for sole use by the QCS system
3 1/2 inch high-density floppy drive
Compact disk (CD) Reader
Color monitor
Laser printer compatible with HP LaserJet III or better, with minimum 4 MB installed memory.
Connection to the Internet, minimum 28 BPS

Software

MS Windows 95 or newer version operating system (MS Windows NT 4.0 or newer is recommended)
Word Processing software compatible with MS Word 97 or newer
Internet browser
The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.
Electronic mail (E-mail) compatible with MS Outlook

1.4 RELATED INFORMATION

1.4.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website; the Contractor can obtain the current address from the Government. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control (CQC) Training

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government shall provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by files attached to E-mail. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government shall be submitted by E-mail with file attachments, e.g., daily reports, schedule updates, payment requests. If permitted by the Contracting Officer, a data diskette or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM). The QCS database typically shall include current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format via E-mail.

1.6.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format via E-mail.

1.6.1.3 Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main) office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.6.1.6 EM 385-1-1, Corps of Engineers Safety Manual and QCS Linkage

Upon request, the Contractor can obtain a copy of the current version of the Safety Manual, EM 385-1-1, on CD or visit "<http://www.usace.army.mil/inet/usace-docs/ent-manuals/em385-1-1/entire.pdf>". Data on the CD will be accessible through QCS, or in stand-alone mode.

1.6.2 Finances

1.6.2.1 Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet and include it with the payment request. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment requests with supporting data by E-mail with file attachment(s). If permitted by the Contracting Officer, a data diskette may be used instead of E-mail. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01451, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a data diskette or CD-ROM reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any

supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01451, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the Government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.6.3.3 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.6.3.4 Accident/Safety Tracking.

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 200.

1.6.3.5 Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC testing, transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.6.4 Submittal Management

The Government will provide the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data

columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Schedule

The Contractor shall develop a construction schedule consisting of pay activities, in accordance with Contract Clause "Schedules for Construction Contracts", or Section 01320, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01320 PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.6.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data, and schedule data using SDEF.

1.7 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of updates, payment requests, correspondence and other data is by E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of computer diskettes or CD-ROM for data transfer. Data on the disks or CDs shall be exported using the QCS built-in export function. If used, diskettes and CD-ROMs will be submitted in accordance with the following:

1.8.1 File Medium

The Contractor shall submit required data on 3-1/2 inch double-sided high-density diskettes formatted to hold 1.44 MB of data, capable of running under Microsoft Windows 95 or newer. Alternatively, CD-ROMs may be used. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.8.2 Disk or CD-ROM Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The Government will provide the file names to be used by the Contractor with the QCS software.

1.9 MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions. The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. 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.

SECTION 01320

PROJECT SCHEDULE
09/99

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 "G" 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 AR.

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

Preliminary Project Schedule; G AR.

Payment Purpose.

Periodic Schedule Updates; G AR.

These updates enables the Contracting Officer assess Contractor's progress.

Qualifications; G AR.

Documentation showing qualifications of personnel preparing schedule reports.

Narrative Report; G AR. Schedule Reports; G AR.

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.

2 PRODUCTS (NOT APPLICABLE)

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 BASIC 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

Not used.

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

Not used.

3.3.2.8 PHASE OF WORK

Not used.

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

Not used.

3.3.4.2 End Phase

Not used.

3.3.4.3 Phase X

Not used.

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 judgment of the Contracting Officer or authorized representative, is necessary for verifying the contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Standard Activity Coding Dictionary

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

3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the preliminary submission, 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 REQUESTS FOR TIME EXTENSIONS

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

3.7.1 Justification of Delay

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

3.7.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the 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.

3.7.3 Additional Submission Requirements

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

3.8 DIRECTED CHANGES

If 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.

3.9 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

SECTION 01330

SUBMITTAL PROCEDURES
09/00

1 GENERAL

1.1 SUBMITTAL IDENTIFICATION

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

- SD-01 Preconstruction Submittals
- SD-02 Shop Drawings
- SD-03 Product Data
- SD-04 Samples
- SD-05 Design Data
- SD-06 Test Reports
- SD-07 Certificates
- SD-08 Manufacturer's Instructions
- SD-09 Manufacturer's Field Reports
- SD-10 Operation and Maintenance Data
- SD-11 Closeout Submittals

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.

2 PRODUCTS (NOT USED)

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 anyway relieve the Contractor of his quality control requirements.

3.5.3 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: _____

SUBMITTAL REGISTER

(R415110)

CONTRACT NO.

TITLE AND LOCATION
Spec Section 01000 - Route 442/405 Sanitary Sewer Extension, Lycoming County PA

CONTRACTOR

SPECIFICATION SECTION

ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS			
					DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS		INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE		DATE	SUBMIT TO GOVERNMENT	CODE
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.1	Title Evidence-Proof of Purchase								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													
			1.1	Inv Copies-Rental Equip								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													
			1.1	Payment-Proof of Payment								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													
			1.1	Photographs								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													
			1.1	Cost-Pricing Data for Equip								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													
			1.1	Progress Schedule				<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>	AR									
			1.1	O/M Data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	AR									
			1.1.1.9	Comm Activity Grinder	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	AR									

SUBMITTAL REGISTER

(11/4/15/1/10)

CONTRACT NO.

TITLE AND LOCATION
Spec Section 01415A - Route 442/405 Sanitary Sewer Extension, Lycoming County PA

CONTRACTOR

SPECIFICATION SECTION

ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS			
					DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS		INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE		DATE	SUBMIT TO GOVERNMENT	CODE
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	aa.
			1.3	CQC Plan						✓						✓	AR									
			1.3	Phase Notification			✓		✓							✓										
			1.3	Request			✓									✓	AR									
			1.3	CQC Manager Quals	✓											✓	AR									
			1.3	Change Notifications										✓		✓										
			1.3	Punch List						✓						✓										
			1.3	Minutes						✓						✓										
			1.3	Tests	✓											✓										
			1.3	Reports						✓						✓										
			1.3	Tests Performed	✓					✓						✓										
			1.3	QC Records						✓						✓	AR									

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number 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 on 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-transmittal, letter of transmittal is not required.
8. When a sample of 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 below 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 01451A

CONTRACTOR QUALITY CONTROL
03/01

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 Bidding 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 AR.

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

Phase Notification

The Government shall be notified in a specified amount of time in advance of beginning the preparatory control phase.

Request; G AR.

The requesting of specialized individuals in specific disciplines to perform quality control.

CQC Mgr Qualification; G AR.

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

SD-05 Design Data

Change Notification

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.

Reports

Results of tests taken.

Tests Performed

An information copy provided directly to the Contracting Officer.

QC Records; G AR.

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

2 PRODUCTS (NOT APPLICABLE)

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

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 5-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 as System Manager but may have duties as project superintendent in addition to quality control. 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

Not used.

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 thirty-five dollars (\$135.00) 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. 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 Corps of Engineers approved testing laboratory or obtain approval for a laboratory at the project site. If the Contractor elects to set up an on-site laboratory, the Contractor will be assessed \$4,500.00 for the cost for 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 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.

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
09/03

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

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 applicable requirements of EP 310-1-6. 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 applicable requirements of EP 310-1-6. 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)

This project does not include temporary electrical work.

1.6 GOVERNMENT FIELD OFFICE

1.6.1 Resident Engineer's Office

The Contractor shall provide the Government Resident Engineer with an office, approximately 200 square feet in floor area, located where directed, and providing space heat, electric light and power, toilet facilities consisting of one lavatory and one water closet complete with connections to water and sewer mains. A mail slot shall be provided in the door, or an apartment-type lockable mail box mounted on the surface of the

door. At completion of the project, the office shall remain the property of the Contractor and shall be removed from the site. All utility connections shall be connected and disconnected in accordance with local codes and to the satisfaction of the Contracting Officer. If a window style air conditioner is used then the refrigerant shall be one of the fluorocarbon gases that is in accordance with FS A-A-58060 and has an Ozone Depletion Potential (ODP) of less than or equal to 0.05.

1.6.2 Trailer-Type Mobile Office (Contractor's Option)

In lieu of constructing, maintaining and, at end of construction period, removing a temporary type field office, the Contractor may, at his option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. The trailer shall be securely anchored to the ground at all four corners to guard against movement during high winds.

1.7 TEMPORARY PAVING PATCH

The Contractor shall place a temporary patch of cold mixed asphalt of adequate size and thickness immediately after utility trenches or other road or paved area openings are backfilled and compacted as specified in DIVISION II. The temporary patch shall be maintained by the Contractor until he permanently repairs the opening as delineated in DIVISION II. (SUGG NO. 75-183)

1.8 BULLETIN BOARD: (NOV 1983)

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

1.9 CLOSURE SIGNAGE

Not required for this project.

1.10 HAUL ROADS (1967)

The Contractor shall, at his expense, construct such access roads and haul roads as may be necessary for proper prosecution of the work under this contract. Haul roads shall be constructed in a workmanlike manner with suitable grades and widths. Sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide all necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control although optional shall be adequate to insure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval of the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul and work areas during any night work operations. Upon completion of the work, haul roads as designated by the

Contracting Officer shall be removed at the expense of the Contractor. (CENAB)

1.11 PLANT COMMUNICATION (JAN 63)

Not required for this project.

1.12 BARRICADES

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazardous areas during both day and night. (CENAB)

1.13 MEASUREMENT AND PAYMENT

No separate measurement and payment will be made for the work performed in this Section 01510, TEMPORARY CONSTRUCTION ITEMS, specified herein, and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor, and shall be included in the overall cost of the work.

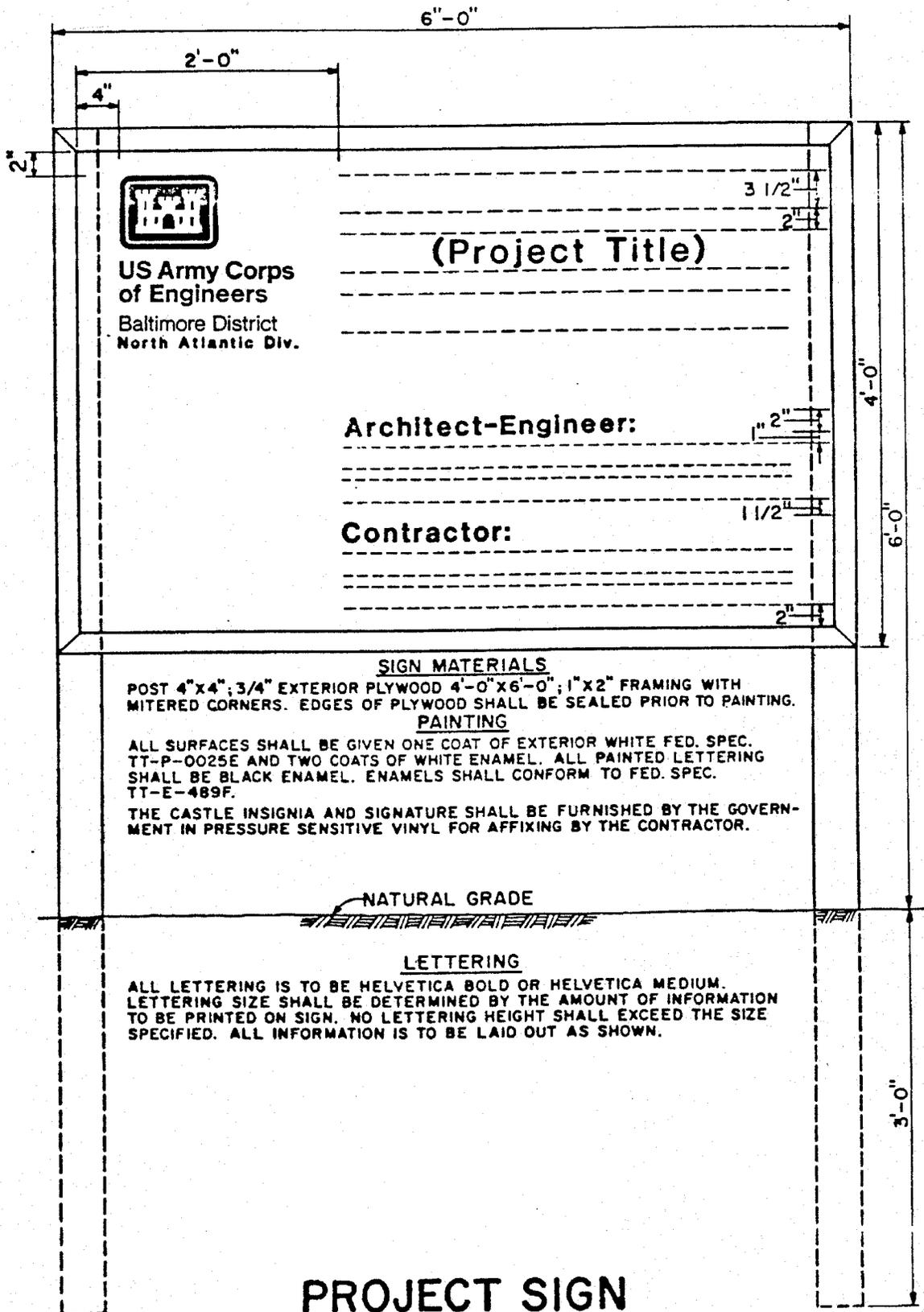
PART 2 PRODUCT NOT APPLICABLE

PART 3 EXECUTION NOT APPLICABLE

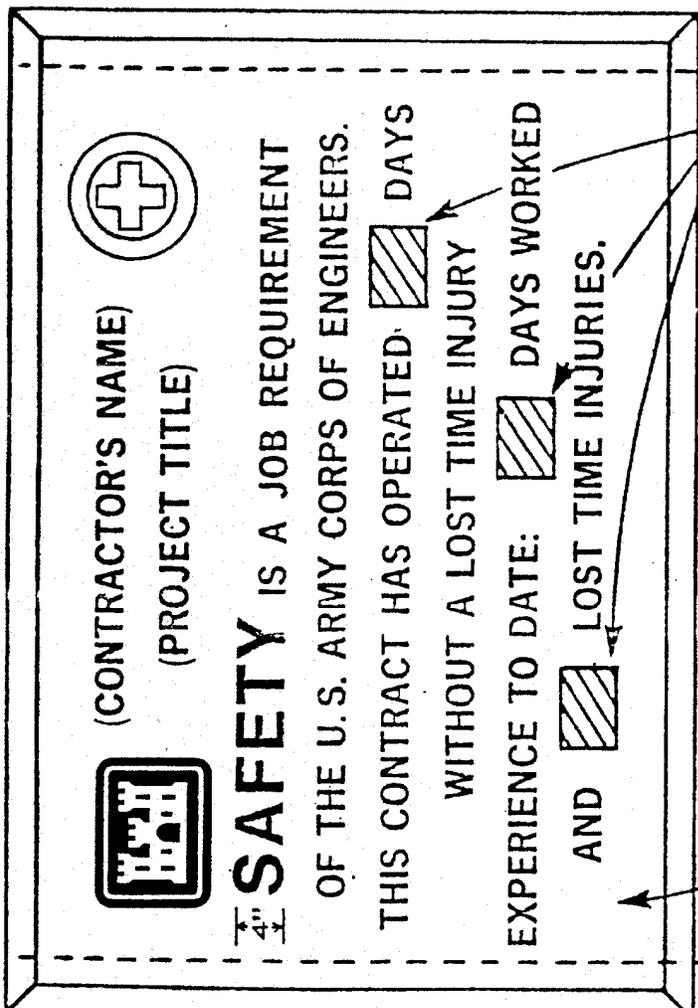
ATTACHMENTS:

Attachment 1 Project Sign

Attachment 2 Safety Sign



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 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 AR.

Location of storage and service facilities.

Temporary Plan; G AR.

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. At the outset of construction, the Contractor will be required to accept by signature a Transfer of Authority letter. The acceptance of the Transfer of Authority places responsibility on the Contractor to fully adhere to the provisions of the General Permit for erosion and sedimentation control and stormwater management.

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.

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.

1.10 MEASUREMENT AND PAYMENT

Except as noted in paragraph, PERFORMANCE AND PAYMENT BOND REIMBURSEMENT above, no separate measurement and payment will be made for the work performed in this Section 01561 ENVIRONMENTAL PROTECTION specified herein and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor, and shall be included in the overall cost of the work.

PART 2 PRODUCT NOT APPLICABLE

PART 3 EXECUTION NOT APPLICABLE

-- End of Section --

SECTION 01670

RECYCLED / RECOVERED MATERIALS

09/00

PART 1 GENERAL

1.1 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.2 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.3 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

The items listed in Table 1 have been identified by EPA as being products which are proposed as possible designated items at some time in the future. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials providing specified requirements are also met.

TABLE 1 EPA PROPOSED ITEMS

<u>PRODUCT</u>	<u>MATERIAL</u>	<u>POSTCONSUMER CONTENT (%)</u>	<u>RECOVERED MATERIALS CONTENT (%)</u>
Flowable Fill	--		
Railroad Grade			
Crossings/Surfaces	--		
Landscaping Timbers & Posts	Plastic		
Park and Recreational			
Furniture	--		
Playground Equipment	--		
Parking Stops	Plastic or Rubber	100	
	Fly Ash (concrete)	--	20-40
	Slag (concrete)	--	25-70
Signage	--		

1.4 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials.

-- End of Section --

SECTION 01720

AS-BUILT DRAWINGS - CADD

04/02

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 AR.

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

Final Requirements; G AR.

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 as-built prints 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 and 2 located at the end of this section.

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.

1.7 PAYMENT

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

PART 2 PRODUCT NOT APPLICABLE

PART 3 EXECUTION NOT APPLICABLE

-- End of Section --

**RECORD DRAWING AS-BUILT
XYZ CONTRACTOR**

Plate: 1
Sheet Number: T-1

FT. INDIANTOWN GAP PENNSYLVANIA
EQUIPMENT CONCENTRATION SITE
COVER SHEET

U.S. ARMY ENGINEER DISTRICT, BALTIMORE CORPS OF ENGINEERS BALTIMORE, MARYLAND	Designed by:		Date: JAN 2001	Rev.
	Dwn by:	Ckd by:	Design file no.	
A/E FIRM/CONTRACTOR 3 LINES PROVIDED OR LOGO	Reviewed by:		Drawing Number: F-XXX-XX-XX	
	Submitted by: Chief, Branch		File name: FILENAME Plot date: 12/25/00 Plot scale: 1=1	

Mark	Description	Date	Appr.	Mark	Description	Date	Appr.
	AS-BUILT	10 SEP 02					
3	REVISED SECTION A-A AND C-C	5 JAN 01	A.E. D.P.				
2	REVISED PER AMENDMENT NO. 2	30 DEC 00	A.E. D.P.				
1	REVISED PER AMENDMENT NO. 1	25 DEC 00	A.E. D.P.				

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Remove surface debris, rubbish, snow and water without unnecessary excavation of topsoil and subsoil.
- B. Remove designated paving, curbs and walks.
- C. Clear site of plant life and grass.
- D. Remove trees and shrubs.
- E. Remove stumps and root system of trees and shrubs.
- F. Topsoil excavation and stockpile reusable topsoil for later use.
- G. Remove and dispose of all excess materials, equipment, trash and debris used for or resulting from the work included in this Section.

1.02 REGULATORY REQUIREMENTS

- A. Coordinate clearing Work with utility companies.
- B. Conform to applicable local, state and federal codes for legal disposal of debris.
- C. Burning and/or on-site disposal of materials are prohibited.
- D. Make all arrangements for disposal sites, unless the Owner designates special locations.
 - 1. All expenses for disposal shall be borne by the Contractor.
 - 2. Bidders shall carefully investigate all aspects of surplus material disposing operations.
- E. Prior to depositing surplus material at any off-site location, obtain a written agreement between Contractor and the owner of the property on which the disposal of the material is proposed.
 - 1. The agreement shall state that the owner of the property gives permission for the Contractor to enter and deposit material of a particular classification on the owner's property at no expense to the project owner, and shall include any other conditions pertinent to the situation as agreed upon by each party.
 - 2. A Copy of said agreement shall be furnished to the Owner.
 - 3. All surplus material stored off-site shall comply with Chapter 102 erosion and sedimentation control measures.
- F. Follow standard horticultural practice for cutting and/or pruning of trees, brush, and shrubs.

1.03 WORK IN PERMANENT EASEMENTS

- A. Remove and dispose of all trees unless shown otherwise on the Drawings.
- B. Remove and dispose of all shrubbery over 2' tall.
- C. Remove and preserve ornamental vegetation under 2' tall, when requested by the property owner.

- D. Carefully disassemble fences and other improvements. Rebuild at original location and preconstruction condition.

1.04 WORK IN TEMPORARY EASEMENTS AND HIGHWAY RIGHT OF WAY

- A. Where the excavation is outside of the drip line of a tree, the tree shall be protected as follows:
 - 1. Tag tree as being designated to remain.
 - 2. Do not stockpile soil or compact the earth in the area under the tree.
 - 3. Avoid damage to branches with operating equipment. Properly prune any broken branches.
 - 4. Cut roots larger than 1" diameter.
- B. Where excavation is within the drip line of the tree, the trees shall be removed and disposed unless designated to be protected on the Drawings.
 - 1. Where a tree is designated to be protected, tag the tree.
 - 2. Install the work using trenchless means, under the drip line area.
- C. Remove and preserve ornamental vegetation when requested by the affected resident. Replant at original location.
- D. Carefully disassemble fences and other improvements. Rebuild at original location and preconstruction condition.

PART 2 PRODUCTS - Not used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that existing plant life designated to remain is tagged or identified.
- B. Mark limits of clearing by flagging fencing or other approved methods.
- C. Vehicles used to haul soft or wet material over streets or pavements shall be sufficiently watertight to prevent deposits on the streets or pavements.
 - 1. In all cases where any materials are dropped from the vehicles of the Contractor, he shall clean up the same, and keep the crosswalks, street and pavements clean and free from debris.

3.02 PROTECTION

- A. Locate, identify, and protect utilities that remain, from damage. The Contractor prior to construction must contact PA One Call.
- B. Install temporary fences (minimum 3 feet high) to protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect benchmarks, control monuments and existing structures from damage or displacement.
- D. Where trees are to be protected or preserved, no clearing and grubbing, except as directly required for construction, shall be performed within the radius of spread of tree branches.
- E. No storage of topsoil materials or construction equipment will be permitted within the radius of spread of tree branches.

3.03 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove paving, curbs, and sidewalks.
- C. Remove trees and shrubs indicated.
 - 1. Remove stumps and root system to a depth of 24 inches.
- D. Clear undergrowth and deadwood, without disturbing subsoil.
- E. Clear site of plant life and grass.
- F. Prune branches and/or roots of trees to be preserved or where they interfere with or obstruct construction operations.
 - 1. If exposed, bend and relocate main lateral roots and tap roots.
 - 2. Engage a state certified arborist or qualified tree surgeon that shall cut roots and/or branches with sharp pruning instruments without breaking or chopping.
 - 3. Qualified Personnel shall paint all cuts with standard tree paint or equivalent which is waterproof, antiseptic, elastic and free of kerosene, coal, tar, creosote, and other harmful substances.
 - 4. Where required, extend pruning procedures to restore the natural shape of the entire tree or shrub.
- G. Damaged Trees - Vegetation designated to be protected, which has been damaged by site clearing activities and deemed non-functional by the owner or Contracting Officer, shall be replaced by the Contractor with vegetation of the same genus and species at Contractor's expense.

3.04 DISPOSAL OF MATERIAL

- A. All material shall be treated as surplus material and disposed of off-site in a legal manner per Article 1.03.

3.05 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or regraded.
- B. All topsoil, loam, or other natural organic materials covering the areas shall be removed; and when suitable for reuse as topsoil shall be stockpiled.
 - 1. Stockpiles shall be established only at approved locations and shall be maintained to prevent erosion and contamination until reuse.
 - 2. To prevent intermixing, topsoil shall not be stockpiled immediately adjacent to other stockpiled materials.
 - 3. All excavated materials shall be stockpiled at locations, which will not create public endangerment or inconvenience.
 - 4. Stockpiles shall be kept clear of Fire Department and police facilities and equipment and, where possible, clear of driveways, sidewalks, and crossings.
- C. Protect stockpiles from erosion.
- D. Remove excess topsoil not being reused, from site.

END OF SECTION

SECTION 02141

REMOVAL OF WATER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide all equipment, materials and labor required to successfully complete the work included in this section.
- B. Provide, maintain and operate pumps and related equipment, including standby equipment, of sufficient capacity to adequately perform dewatering as required by this section.
- C. Lower the groundwater table elevation.
- D. Intercept seepage from excavation slopes.
- E. Control any groundwater flow that may adversely affect excavation or construction activities.
- F. Collect, remove, and dispose of all excess groundwater.
- G. Collect, remove, and dispose of all wastewater.
- H. Remove and/or dispose of all spoil excess materials, equipment, trash and debris used for or resulting from the work included in third section.

1.02 REGULATORY REQUIREMENTS

- A. Conform to applicable local, state and federal codes for legal disposal of water.
- B. Temporary water supplies shall meet requirements of Local, State and Federal Regulatory Agencies.
- C. Conform to all OSHA standards.

1.03 PAYMENT

- A. Site dewatering is incidental to construction and no separate or additional payment will be made for it.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine adjacent structures and utilities, both existing and under construction, for possible settlement, movement or other adverse effects resulting from dewatering methods or water removal.
 - 1. Take necessary precautionary steps to protect such structures and utilities.
- B. Should the draw down of groundwater levels by removal or dewatering systems critically reduce or disrupt public or private water supplies, the Contractor shall be prepared to:
 - 1. Provide adequate potable water to the owners or users of the affected water supplies until groundwater levels have recovered, so as to sufficiently restore those deficient water supplies.
 - 2. Provide to the Contracting Officer documentation to confirm that temporary water supplies meet the requirements of Local, State and Federal Regulatory Agencies.

3.02 REMOVAL OF WATER

- A. Assume responsibility for site, surface and subsurface drainage.
 - 1. Maintain such drainage as specified herein during the life of the contract.
- B. Supply all supervision, labor, material, equipment, including standby equipment, necessary to maintain a dry excavation as may be necessary to construct the project.
- C. Maintain groundwater in or below the bearing strata at a safe level at all times by methods which prevent loss of fines, which preserves the undisturbed state of subgrade soils and which sufficiently lowers the groundwater level in permeable strata at or below excavation and fill levels such that blowing or unstable conditions do not develop in the bottom or sides of excavation or fill areas.
- D. Protect all adjacent structures, existing and under construction, from settlement, flotation, damage or other adverse effects resulting from water removal or dewatering methods.
- E. Install all drains, ditching, sluiceways, pumping and bailing equipment, wicking, sumps, wells, well points, cutoff trenches, curtains, sheeting and all other equipment and structures necessary to create and maintain a dry excavation and a groundwater level at a minimum of two (2) feet below excavation subgrades.
 - 1. As part of any dewatering system, observation wells or piezometers shall be provided and installed, as required, to effectively and efficiently monitor draw down to required levels.
- F. Discharge water removed from the site to natural watercourses, storm drains or channels.
 - 1. Large quantities of water shall not be discharged as overland flow.
 - a. Overland flow is not permitted onto private property.

2. No unpolluted water shall be discharged to sanitary sewers.
 3. Wastewater shall be disposed of in a manner satisfactory to the Owner, the Contracting Officer and local stormwater management regulations.
- G. Dewatering operations shall cease when all foundations, structures, pipe installations and other excavated areas have been properly backfilled and compacted, and are safe from damage, flotation, settlement and displacement.

3.03 MAINTENANCE

- A. Operate and maintain dewatering and removal operations on a 24-hour basis for the time required for successful completion of the work.

3.04 REMOVAL

- A. After groundwater levels have returned to elevations appropriate for conditions and time of year, without causing damage to the work, remove all dewatering equipment and related materials from the site and restore site to original conditions or rehabilitate site to meet requirements of Contract Documents.

END OF SECTION

SECTION 02161

SHEETING AND BRACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheeting and bracing installation.
- B. Procedures for removal of sheeting and bracing after construction are complete.
- C. Procedures for sheeting and bracing that are to be left in place.
- D. Design requirements.
- E. Regulatory codes and requirements.

1.02 REGULATORY REQUIREMENTS

- A. All sheeting and bracing including the use of mobile shields shall conform to Public Law 91-596 (Williams Steiger Act) and occupational Safety and Health Administration Act (OSHA) of 1970 and its amendments and regulations.

1.03 REFERENCES

- A. ASTM A6/A6M - General Requirements.
- B. ASTM A328 - Steel Sheet Piles.
- C. NFPA - National Forest Products Association.

1.04 SUBMITTALS

- A. None.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood - Tongue and groove, #3 Common Douglas Fir or Hemlock or Utility grade Southern Pine; NFPA grading or equal, meeting the requirements of the NFPA.
- B. Steel - ASTM A36 as required by ASTM A328 and sized as needed.
- C. Trench Boxes - Fabricated Steel or Aluminum.

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PART 3 - EXECUTION

3.01 PREPARATION

- A. When so designated on the drawings, or stated in the Specifications or to comply with Local, State, or Federal (OSHA) regulations, or when sloped excavations are not feasible, not possible or allowed, or if excavations endanger adjacent facilities, sheeting and bracing shall be designed and monitored by a professional Contracting Officer, licensed in the state where the project is being constructed, for all loading conditions to which the sheeting and bracing will be subjected during construction.

3.02 PROTECTION

- A. Sheeting shall not be driven while concrete is being placed, or within 24 hours after placement, nor during pile load testing.

3.03 PERFORMANCE

- A. Provide all materials, equipment and labor necessary to construct and maintain all required excavation support systems.
- B. Sheeting and bracing support systems shall include, but shall not be limited to, wall support such as wood sheeting, ringwales, lagging, soldier piles, steel sheeting, trench boxes and bracing members such as stringers, struts, rakers, shores, tieback anchors, etc. necessary to prevent damage to the work and for the safety of workers, the general public or adjacent property.
- C. Design sheeting and bracing systems against failure from the maximum loads that will occur during construction, including surcharge loads and additional loading due to construction equipment.
- D. Design sheeting and bracing systems to enable safe construction of structures, utilities and appurtenances, and prevent excessive ground loss, displacement of adjacent foundations, and displacement of the bottom of the excavation.
- E. No excavation shall be performed below a line drawn down and away at a slope of two horizontal and one vertical from the nearest footing or grade beam of the existing building or as shown on the drawings without providing sheeting, shoring and bracing to provide lateral support for soils beneath the foundations of the building and to prevent damage to the building.
- F. Design of bracing shall be such as to permit proper construction of the walls and footings and proper installation of the utilities as shown on the drawings.
- G. Do not brace to concrete without written approval of the Contracting Officer.

1. If approved, concrete must have attained design strength, as determined by compression testing of representative concrete cylinders, which have been cured on-site.
- H. Install sheeting and bracing systems in a logical sequence as excavation operations are performed.
1. If a prefabricated mobile shield is used, the bottom of the shield shall be maintained as high as possible (preferably above the spring line of the pipe, maximum 2 feet) to prevent disturbance of the bedding material and tension forces on pipe joints.
 2. Openings or troughs created by the use of a shield shall be filled and compacted in accordance with Section 02225 and Section 02228. No additional compensation will be allowed for such filling and compacting.

3.04 MAINTENANCE

- A. Maintain sheeting and bracing systems as functional on a 24-hour basis.
- B. Provide a means of determining movement of excavation walls, and adjacent soil, buildings and structures and utilities.
1. If movement or damage occurs, immediately cease all construction activities, install temporary measures to prevent further movement or damage and notify the Contracting Officer.
 2. Movement or damage due to failure of sheeting and bracing systems shall be permanently repaired as soon as possible, at no cost to the Owner and at no additional cost for time.

3.05 REMOVAL

- A. Remove sheeting and bracing as the work progresses in a manner, which shall prevent damage to finished work, adjacent structures and property.
1. All voids created by removal of sheeting and bracing shall be filled and compacted in accordance to the guidelines of Sections 02225 and 02228. No additional compensation will be allowed for such filling and compacting.
- B. Where shown on drawings, specified or approved, sheeting shall be cut off as specified, or a minimum of 2-1/2 feet below proposed final grade.
1. Sheeting to be left in place shall be new and unused material.
 2. Contractor may elect to leave sheeting and bracing in place (cut off as described above) at his own expense and with Contracting Officer approval.
 3. Provide to the Contracting Officer a drawing of cut-off sheeting locations.

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- a. Drawing should show site plan with dimensioned locations of sheeting, type of material remaining, and depths or elevations to top and bottom of remaining sheet.

3.06 SPECIAL CONDITIONS

A. Unauthorized Work

1. Repair or replace any system or part of any system, which does not function as, intended for safe construction.
2. Damaged or improperly driven sheeting shall be removed and replaced with new, properly placed sheeting at the Contractor's expense.

END OF SECTION

SECTION 02205

PROTECTION OF EXISTING FACILITIES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Location of Facilities.
- B. Notification of Owners and Authorities.
- C. Coordination and Preparation.
- D. Protection of Facilities.
- E. Relocation of Facilities.
- F. Protection of Sewers and Storm Drains.
- G. Protection of Water Mains Near Sewers.
- H. Abandonment of Utilities.
- I. Restoration of Property Markers.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 LOCATION OF FACILITIES

- A. Prior to construction, verify location of existing underground facilities near or adjacent to project.
 - 1. Consult with the Pennsylvania One Call System and arrange for field stakeout or other markings to show locations.
 - 2. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.
- B. Report field stakeout findings and results of exploratory excavations to Contracting Officer if possible changes in project location or design are indicated because of suspected interferences with existing facilities.
 - 1. Allow Contracting Officer sufficient time to determine magnitude of changes and to formulate instructions in that regard.
- C. If location of an existing underground facility is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.02 NOTIFICATIONS OF OWNERS AND AUTHORITIES

- A. Prior to construction, notify owners of existing facilities, including local Police and Fire Departments, of general scope, nature and planned progress schedule of the work.
- B. Notify owners of nearby underground facilities when excavating or blasting is to take place in a particular area, allowing them reasonable time to institute precautionary

procedures or preventive measures which they deem necessary for protection of their facilities.

- C. When existing utilities, such as sewer, water, gas, telephone or electric power are damaged or disturbed during construction, immediately notify affected owner and Project Owner.
- D. Notify Police and Fire Departments, including affected owners, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facility or as a result of other activities at project site.
 - 1. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, -downed electrical wires, and disrupted underground electrical cables.

3.03 COORDINATION AND PREPARATION

- A. Discuss anticipated work schedule with local authorities and owners of utilities at preconstruction meeting, including procedures to be followed if one or more utilities are damaged or disrupted.
- B. Develop contingency plans to address Contractor's role in repair of damaged utilities.
- C. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.
- D. Adjust work schedules and personnel assignments as necessary to conform with requirements of utility owner whose utility is to be temporarily interrupted during construction.
 - 1. Cooperate with utility owner in this regard to minimize the time of interruption.
- E. Make preparations for and conform to applicable Federal, State and local regulations regulating use of proper safeguards and procedures when excavation and/or blasting is to take place in close proximity to existing facilities and structures.

3.04 PROTECTION OF FACILITIES

- A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the work, including electric, telephone, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.
- B. Protect existing facilities from damage or movement through installation of adequate support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas.
- C. Contractor shall promptly repair existing utilities and other facilities, which are damaged by the Contractor's construction operations, to the satisfaction of the affected owner or, if he so elects, that owner will perform the repairs with his own forces.

1. Under either arrangement, such repair work shall be done at Contractor's expense.
- D. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify Contracting Officer and consult with affected owner regarding temporary removal and later restoration of the interfering item.
1. Arrange with that owner to remove and later restore the interfering item to the satisfaction of the owner, subject to approval of the project owner; or, allow affected owner to perform such work with his own forces.
 - a. Under either arrangement, such work shall be done at Contractor's expense.
- E. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities.
1. No burning of trash or debris is permitted.
 2. If permanent fire extinguishers are used, they shall be recharged and in new condition when turned over to Owner.

3.05 RELOCATION OF FACILITIES

- A. If the location or position of an existing gas or water pipe, public or private sewer or drain, conduit or structure be such as, in the opinion of the Contracting Officer, to require its removal, realignment or change, such alteration shall be without cost to the Contractor for the work of removal, realignment or change only.
- B. Uncovering, supporting and sustaining such facility before its removal or before and after its realignment or change, shall be the Contractor's responsibility as part of the work of his Contract.
- C. Contractor shall be entitled to extension of time for completion of entire Work as the Contracting Officer determines that the entire work was delayed by the removal, realignment or change of such obstruction.

3.06 PROTECTION OF SEWERS AND STORM DRAINS

- A. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or piping to maintain flow around that segment of the work such that no back-ups occur in existing systems.
- B. Maintain existing manholes, catch basins, and other utility structures in their pre-work condition.
 1. Any material or debris entering same due to the Contractor's operation shall be promptly removed.

3.07 PROTECTION OF WATER MAINS NEAR SEWERS

- A. Where a minimum 10-foot horizontal separation or minimum 18-inch vertical separation (bottom of water pipe to top of sewer pipe) cannot be maintained between a water main and sewer line, one or more of the following remedies shall be incorporated in the work:
 - 1. The sewer lines shall be encased in Type C concrete for a length of 10 feet on either side of the water main.
 - 2. Both the water main and sewer line shall be constructed of pressure type joints of ductile iron pipe, and shall be pressure tested in accordance with specifications to assure water tightness.
 - 3. One full length of water main shall be centered over the sewer line, so that both joints will be as far from the sewer as possible.
 - 4. Relocate water main to obtain 18-inches minimum vertical separation.

3.08 ABANDONMENT OF UTILITIES

- A. Remove existing utilities to be abandoned within limits of trench excavation, or impinging on trench limits.
- B. Open ends of abandoned utilities, or those scheduled for abandonment, shall be bulk headed by brick masonry or Type C concrete; or by cast iron plugs or caps in small diameter water mains.
- C. Abandoned sewers 36-inch diameter or larger shall be completely filled with sand or gravel or other approved material prior to bulk heading the open end(s).
- D. Abandoned manholes and water valve casings shall be backfilled to grade with approved trench backfill material.
- E. Frames, covers, grates, water valve casing, sections of water piping, hydrants (including standpipe and boot) valves and other items to be abandoned shall, if ordered by Owner, be salvaged for re-use and be delivered to Owner's property yard.

3.09 RESTORATION OF PROPERTY MARKERS

- A. Property corner markers, boundary monuments, etc., disturbed or moved by the Contractor's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor.
 - 1. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him which shows the work accomplished.
 - 2. One copy of the map shall be given to the property Owner and one copy given to the project owner.

END OF SECTION

SECTION 02211

ROCK REMOVAL

PART 1 GENERAL

1.01 DESCRIPTION

- A. This section describes materials and methods employed for the removal of rock in definite ledge formation, and severed or fragmented rock that cannot be removed by means of a suitable shovel or backhoe, suitably powered, in good condition and properly operated, without continuous drilling, blasting, barring and/or wedging. A suitable "shovel" or "backhoe" is defined as equipment of the proper type, size and power to perform the excavation required. Rock Removal shall also include boulders, portions thereof, concrete and cement masonry structures (not specified to be removed under other Items of work) of 1 cubic yard or more in volume which are to be removed from within the payment lines for trench excavation, or as directed by the Contracting Officer.
- B. Comply with any limitations or other requirements of the Pennsylvania Department of Transportation pertaining to blasting in State Highway Right of Way.

1.02 SUBMITTALS

- A. Permit and Licenses: If explosives are used, all requirements for transportation, use and storage of Local, State and Federal laws and regulations must be complied with and all necessary permits and licenses obtained by the Contractor at his expense. Permits and licenses must be shown to the Contracting Officer on request.
- B. Blasters: The Contractor will submit a resume of experience and references of the person(s) responsible for the supervision of blasting for the Contracting Officer's approval.
- C. Insurance: No explosives shall be brought into, stored or used on the site of any job by the Contractor unless and until he shall have furnished the Contracting Officer with a satisfactory certificate of insurance showing that the risks arising from the presence of and use of explosives and from blasting are included within the insurance provided by the Contractor to secure his obligations to the Owner. Insurance is to also cover damage to any underground utilities or other underground facilities.

PART 2 PRODUCTS

Not Applicable.

PART 3 EXECUTION

3.01 GENERAL

- A. Controlled blasting shall be done to permit the cut to the lines, grades, and cross sections indicated on the Contract Drawings. Rock shall be fragmented to less than one cubic yard. Breakage one cubic yard or greater will be further fragmented by mechanical means or block holing at no expense to the Owner.

- B. Competent experienced blasters will do all blasting. Person(s) responsible for blasting shall be present and supervise all blast design, loading, and shot firing. Person(s) responsible for blasting shall have the required license and conduct all blasting operations in accordance with applicable laws and safety regulations.
- C. An accurate blasting log must be maintained continuously for the duration of the Contract. The log shall record for each shot the location, numbers of holes, depth, spacing, amount of explosive per hole, number of caps used and the exact date and time of the blast. In addition, a sketch showing displacement of direct and delay caps for each shot shall be recorded.
- D. The rock must be completely matted when blasts are fired to prevent damage or injury to persons or property or the scattering of broken fragments on the adjacent ground. Adequate warning shall be given all persons in the vicinity before any blast is discharged. When blasting is required, the operation shall be conducted with such care as not to cause damage to any of the existing underground utilities. Should such occur, the cost of repairs should be the sole responsibility of the Contractor.
- E. The Contractor shall notify each public utility of others having structures in proximity to the site, and others who may be affected, of his intention to use explosives. Said notice shall be given in accordance with the applicable regulations therefore and sufficiently in advance to enable the involved agencies/companies/persons and the Contractor to take such steps as may be necessary to protect life and property. Such notice shall not in any way relieve the Contractor of responsibility for any damage resulting from his blasting operations.
- F. When in sufficiently close proximity (minimum of 10 feet) to existing gas, water, sanitary storm, subway or other utilities and all services connected thereto, the Contractor shall remove the rock by methods other than blasting, if necessary, in order to protect said utilities and their services from damage. Approved methods other than blasting include barring and wedging, jackhammer, drilling, rock jacks, and other such hand or machinery methods, which will not damage the adjacent utility.
- G. CONTROLLED DELAY BLASTING WILL BE USED. The CONTRACTING OFFICER may require that blasts be monitored with a seismograph at the sole expense of the CONTRACTOR.
- H. Whenever a stub for a proposed sewer, a connection lateral, an extension of a sewer or other connection is built in rock, the rock shall be excavated not less than 5 feet beyond the end of the stub, lateral or extension. When the need for explosives is ended, all such material remaining on the job shall be promptly removed from the premise.

END OF SECTION

SECTION 02225

TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavate trenches for utilities.
- B. Pipe Bedding.
- C. Backfilling.
- D. Materials.

1.02 REFERENCES

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Course Aggregates.

1.03 SUBMITTALS

A. Granular Materials

1. Granular materials required for filling, backfilling, bedding, subbase, and other purposes shall be as shown on the Drawings.
2. Prior to bidding, prospective contractors shall familiarize themselves with the available quantities of approved on-site and off-site materials.
3. For each on-site or off-site material proposed, furnish to Contracting Officer for approval a certified gradation analysis at least 10 days prior to date of anticipated use of such material.
4. Except as specified herein, only off-site approved materials shall be utilized.
3. The Contracting Officer reserves the right to inspect proposed sources of off-site granular material And to order such tests of the materials as he deems necessary to ascertain its quality and graduation of particle size.
 - a. The Contractor shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Contracting Officer.
 - b. If similar tests of the material from a particular source were performed previously, submit results of these tests to the Contracting Officer for consideration.
4. No granular materials shall be used on this project for fill, backfill, bedding, subbase, or other purpose until approval is obtained from the Contracting Officer, and only material from approved sources shall be used.

1.04 FIELD MEASUREMENTS

- A. Verify that intended elevations for the work are as shown on Drawings.

PART 2 PRODUCTS

2.01 ON-SITE MATERIALS

- A. Excavated Material

Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material onsite is approved for reuse and is suitable, it shall be used for filling or backfilling purposes. If he so elects, the Contractor may at his own expense, substitute other types of the Contracting Officer approves material in place of excavated material, provided such substitution in advance. All replaced or surplus material shall be disposed of as outlined in Section 02110.

- 1. Suitable Excavated Material

Excavated material from which all frozen material, boulders, trash, foreign debris, and material greater than 6 inches in any dimension has been removed. Excavated material shall be used for all backfilling except under structures or as otherwise noted.

- 2. Select Excavated Material

Excavated material and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 2 inches in any dimension have been removed.

2.02 OFF-SITE MATERIAL

- A. Within the following specifications where grain size distribution requires a maximum of 10 percent or less material capable of passing the #200 mesh sieve, the percentage of material finer (than the #200 sieve) by weight shall be determined by wet screening in accordance with ASTM Standard D-1140.
 - 1. It is the intent of the specifications to allow the use of granular materials from local suppliers.
 - 2. Material specifications shall conform to the requirements of the Commonwealth of Pennsylvania Department of Transportation, Publication 408 Specifications.
- B. No gravel, sand, crushed stone or crusher run material shall be used for this project until acceptance is obtained from the Contracting Officer, and only material from approved sources shall be used.

1. A certified sieve analysis from the supplier shall be submitted for the Contracting Officer's acceptance prior to the use of any materials specified in Article 2.02, Off-Site materials.
- C. Coarse Aggregate (#57 and #2A)
1. Shall conform to Section 703.2 of the latest issue of PENNDOT Publication 408 Specifications.
- D. Sand Bedding
1. Cushion sand shall consist of clean, hard, durable, uncoated particles reasonably free from lumps of clay, silt vegetation, and all deleterious substances. It shall meet the requirements of Type A or Type B #1 fine aggregate in Section 703.1 of the latest of PENNDOT Publication 408.
 2. Sand bedding shall meet the requirements of AASHTO M6.
- E. Warning Tape
- Warning tape shall be colored in accordance with the American Public Works Association uniform color code and clearly marked as to type of utility. Tape for ferrous piping shall be all plastic, three inches wide. Tape for non-ferrous piping shall be plastic over an aluminum core, four inches wide.
- F. Concrete
- Reinforcing bars shall be deformed bars conforming to ASTM A-616. Concrete shall be Type C concrete as specified in Section 704 of the latest issue of PENNDOT Form 408. Test cylinders shall be taken if directed by the Contracting Officer.
- G. Required Materials
1. Backfill shall be as on the Contract Drawings.
 - a. Trench Backfill

In roadways, from 1 ft above the pipe	Gravel fill
Other areas	Native fill
 - b. Pipe bedding Crushed stone | - c. Road construction See Contract Drawings | - d. Backfill below structures Crushed stone |

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify fill materials to be used are acceptable.
- B. Verify that all subsurface installations for the project have been accepted and are ready for backfilling.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Prior to start of construction, notify the Pennsylvania One Call System and have staked or marked all underground utilities.
 - 1. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services.
 - 2. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities, location and elevation.
 - a. Provide the Contracting Officer with the results of the exploratory excavations for his review.
 - b. Allow the Contracting Officer sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.
- C. Abandoned pipes and laterals shall be plugged in with 12 inches of concrete or grout or for large pipes with solid brick masonry.
- D. Conduct the operations such that no interruptions to the existing utility system shall occur.
 - 1. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or temporary piping to maintain flow around the work site such that no backups occur in these sewer systems,.
- E. Maintain existing manholes catch basins, and other utility structures above and below grade, which are to remain in their pre-work condition.
 - 1. Any material or debris entering same due to the operation shall be promptly removed.
- F. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- G. Protect working points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
 - 1. Preserve the control points provided by the Contracting Officer throughout the life of the project, and accurately replace any such point, which is damaged or moved, at Contractor's expense.
- H. Cut out soft areas of subgrade not capable of in-site compaction.
 - 1. Backfill with specified pipe foundation and compact to density equal to or greater than requirements for subsequent backfill material.

- I. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by backfilling operations.
- J. Maintain a stable, dry backfill area in accordance with Section 02141.
- K. Remove all water, snow, ice and debris from surfaces to accept fill materials and from the backfill material.
 - 1. No calcium chloride or other chemicals shall be used to prevent freezing.
- L. Areas to receive compacted fill shall be graded to prevent surface runoff and ponding in accordance with Section 02110.
- M. No fill or backfill material may be used without approval of the Contracting Officer.
- N. Backfill operations shall be started at the lowest elevation in the area to be backfilled, and continue, in horizontal layers, upward to the limits specified.
- O. Backfill material shall be within 2 percent of the optimum moisture content for that material.
- P. Any crushed gravel stockpiles, which have undergone excessive particle segregation, shall be reviewed and approved by the Contracting Officer prior to placement.

3.03 TRENCH EXCAVATION

- A. Trenches for underground piping shall be excavated and maintained as shown on the Drawings and specified in this Section.
 - 1. As specified in this section, trench widths shall be held within the minimum and maximum limits shown on the Drawings.
 - 2. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in pipe trenches, the bottom of the shield shall be maintained as high as possible (preferably above the spring line of the pipe) so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward.
 - a. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and thoroughly compacted.
 - b. Installation of sheeting and bracing and use of mobile shields shall be in complete accordance with all details of applicable codes, rules and regulations including all applicable local, State and Federal regulations including the occupational Safety and Health Act (OSHA).
- B. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.

- C. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special pipe foundation installed in conformance with the Contract Documents.
 - 1. Operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.
- D. Bedrock, boulders, and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe.
 - 1. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.
- E. Trenches shall not be opened for more than 50 feet in advance of installed pipe.
 - 1. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations.
 - 2. No more than 40 feet of trench shall be left open overnight.

3.04 EXCAVATION CLASSIFICATION

- A. All excavation performed under this section is unclassified. Remove all material that is encountered.

3.05 UNAUTHORIZED EXCAVATION

- A. The Contractor shall not be entitled to additional compensation for unauthorized-excavations carried beyond or below the lines and subgrades prescribed in the Contract Documents.
 - 1. The Contractor shall refill such unauthorized excavations at his own expense, and in conformance with the following provisions of this Article.
- B. Should the Contractor, through negligence or for reasons of his own, carry his excavation below the designated subgrade, Type "C" concrete or such other material as may be approved by the Contracting Officer, as specified in Part 2, shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface.
 - 1. Granular material used for backfilling shall be spread and compacted in conformance-with the requirements of later Articles of the section, and to the percentage compaction outline therein.
 - a. The cost of any tests associated with this refilling operation shall be borne by the Contractor.
- C. Excavation below subgrade, which is ordered by the Contracting Officer because the normal subgrade has been disturbed by the Contractor's operations, shall be considered as unauthorized excavation.

3.06 MAINTENANCE OF EXCAVATIONS

- A. All excavations shall be properly and legally maintained while they are open and exposed.
 - 1. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition.
 - 2. All signs, markers, barricades shall conform to the requirements of the manual of Uniform Traffic Control Devices.
 - 3. All barricades, signs and markers shall be reflectorized.
- B. To maintain traffic and safety, temporary plating over trenches consisting of steel plates shall be used to temporarily bridge trench excavations.
 - 1. Plates shall be of size and positioned to provide adequate bearing at plate edges, shall be securely anchored, and shall be fitted in place in a manner to minimize noise when crossed by traffic.
 - 2. Plates shall be of sufficient thickness to safely carry heavy traffic without detrimental deflection; however, unless otherwise specified, the minimum thickness of plates shall be 1-inch.
- C. Plate edges exposed to traffic shall be feathered with asphalt mix as part of trench excavation work.
 - 1. Work includes surveillance and adjustment of plating over trenches, which shall be provided by the Contractor during non-working hours, weekends, and holidays.

3.07 PIPE FOUNDATIONS

- A. All pipes, fittings or specials, which are to be installed in the open trench excavation, shall be properly bedded in, and uniformly supported on pipe foundations of the various types specified herein and shown on the Drawings.
 - 1. Flat-bottom trenches of required width shall be excavated to the necessary depth as shown on the Drawings and maintained in accordance with this section prior to installing the foundation.
 - 2. Trenches shall be dewatered and all work performed in a dry trench.
- B. Bedding material shall be spread in maximum of 4-inch layers to the midpoint of the pipe and each layer shall be compacted until the required total depth of the bedding has been built up.
 - 1. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing, as well as mechanical compactors.

2. The Contractor shall perform his bedding operations with care to maintain line and grade.

C. Normal Soil Conditions – Stone Encasement

1. Unless shown otherwise in the Drawings, all pipes shall be encased in coarse aggregate as detailed on the Drawings.
2. The trench shall be excavated five inches deeper than the bottom of the pipe.
3. Acceptable No. 57 stone bedding as described in the Contract Specifications shall be furnished, placed and compacted in the trench for its full width such that, after the pipe has been uniformly bedded in this material, the required minimum depth of bedding material remains between pipe and undisturbed trench bottom.
4. Suitable holes shall be provided in the trench bottom to permit adequate bedding of bells, couplings, or similar projections.
5. The No. 57 stone bedding shall extend upward to a point 12 inches over the top of the pipe.
6. Minimum width of pipe foundation shall be outside diameter of pipe plus 12-inches.

D. Moderately Unstable Soil Conditions – Stone Foundation

1. When specifically called for on the Drawings, or when ordered by the Contracting Officer, the pipe shall be supported on foundation.
2. The foundation shall be installed where a suitable supporting soil or rock stratum occurs within two feet, more or less of the bottom of the pipe.
3. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum.
4. Crushed stone shall then be furnished and placed in the trench for its full width.
5. The pipe foundation material is to be supported on a geotextile fabric foundation as required by the Contracting Officer.
6. The crushed stone shall extend from the supporting stratum up to an elevation 4, 6 or 8 inches below the bottom of the pipe depending upon the pipe diameter.
7. The bedding material shall then be installed in accordance with stone encased foundation requirements.

3.08 GENERAL BACKFILLING REQUIREMENTS

- A. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, concrete has acquired a suitable degree of strength, and subgrade waterproofing materials have been in place for at least 48 hours.
 - 1. Backfilling shall be carried on expeditiously thereafter.
 - 2. Backfill shall be started at the lowest section of the area to be backfilled.
 - 3. Natural drainage shall not be obstructed at any time.
- B. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed.
 - 1. No backfill shall be placed against foundation walls on structural members unless they are properly shored and braced or of sufficient strengths to withstand lateral soil pressures.
- C. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed.
 - 1. Stones larger than 12 inches in any dimension shall be removed or broken.
 - 2. Stones shall not be allowed for form clusters with voids.
- D. Backfill material shall not be placed when moisture content is more than 2 percent above optimum or is otherwise too high to allow proper compaction.
 - 1. When material is too dry for adequate compaction, water shall be added to the extent necessary.
- E. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed.
 - 1. No calcium chloride or other chemicals shall be added to prevent freezing.
 - 2. Material incorporated in the backfilling operation, which is not in satisfactory condition, shall be subject to rejection and removal at the Contractor's expense.
- F. Remove surplus backfill material from site.

3.09 PIPE TRENCH BACKFILL

- A. Pipe foundations are specified in the appropriate sections covering underground piping.
- B. The remainder of the trench shall be backfilled and consolidated in accordance with Section 02228 and the following method.

1. Backfill material shall be placed in accordance with the Contract Drawings and each layer thoroughly compacted by a backhoe mounted hydraulic or vibratory tamper, up to 4 feet under pavement (below top of subgrade). The 3 feet directly above the pipe shall be compacted using hand-guided or small self-propelled vibratory or static rollers or pads according to the Contract Drawings. Refer to Section 02228 for density requirements.

3.10 PERIODIC CLEANUP BASIC RESTORATION

- A. As the work progresses, promptly backfill, compact, grade and otherwise restore the disturbed area to a basic condition, which will permit continuation of its use.
 1. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere.
 2. Unsightly mounds of earth, large stones, boulders and debris shall be removed so that the site presents a neat appearance.
- B. The Contractor shall perform the clean up work on a regular basis and as frequently as required.
 1. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area.
 2. Work shall also be accomplished if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- C. Upon failure of the Contractor to perform periodic clean-up and basic restoration of the site to the Contracting Officer's satisfaction, the Owner may, upon five (5) days prior written notice to the Contractor, without prejudice to any other rights to remedies of the Owner, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Contracting Officer, and all costs resulting there from shall be charged to the Contractor and deducted from the amounts of money that may be due him.

3.11 TOLERANCES

- A. Top Surface of Backfilling - Under paved areas, $\pm 1/2$ inch from required elevations.
- B. Top Surface of General Backfilling - ± 1 inch from required elevations.

3.12 FIELD QUALITY CONTROL

- A. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698, D1557, and with Section 02228.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D1557, ANSI/ASTM D698, and with Section 02228.

3.13 PROTECTION OF FINISHED WORK

- A. Regrade and recompact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02228

COMPACTION

1 GENERAL

1.1 SECTION INCLUDES

- A. Compaction requirements and test methods.
- B. Compact all subgrades, foundations, replaced, filled and backfilled material as specified.

1.2 REFERENCES

- A. ANSI/ASTM D698 Test methods for Moisture-Density Relations of Soils and Soil-Aggregate mixtures, using 5.5 lb Rammer and 12-inch drop.
- B. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. Nuclear Moisture Density Testing by “probe” methods.

1.3 SUBMITTAL

- A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

1.4 QUALITY CONTROL

- A. The Contractor shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, structure and piping to be placed thereon, or therein, without damage to the new or existing facilities.
- B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.
- C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if the teeth of excavating equipment disturb its surface.
 - 1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.
 - 2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varied clays, no compaction shall be applied.

2 PRODUCTS

2.1 MATERIALS

- A. Submit material samples to be used on project to testing laboratory. See Section 02225.

3 EXECUTION

3.1 EXAMINATION

- A. See Section 02225.

3.2 PREPARATION

- A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.
- B. Proof-roll all subgrade surfaces to accept fill material.
- C. Each layer of fill shall be compacted to the specified density the same day it is placed.
 - 1. The moisture content of backfill or fill material shall be adjusted, if necessary to achieve the required degree of compaction.
- D. Compact each lift as detailed on the Drawings.
- E. Match compaction equipment and methods to the material and location being compacted in order to obtain specified compaction, with consideration of the following guidelines:
 - 1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.
 - 2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.
 - 3. Compaction roller should be lighter in weight than proof rolling equipment, with a minimum compaction force of 350 pounds per linear inch (PLI).
 - 4. Vibratory compaction is preferred for dry, granular materials.
 - 5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.
 - 6. Hydraulic compaction by pounding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Contracting Officer and after a demonstration of effectiveness.
 - 7. Backhoe mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth.

- a. The 3 feet of backfill directly above PVC pipe shall be compacted with hand-guided or self-propelled vibratory compactors or static roller.

3.3 FIELD QUALITY CONTROL

A. Material Testing

1. The Contracting Officer reserves the right to order testing of materials at any time during the work.
2. Testing will be done by a qualified, independent testing laboratory in accordance with this Section 01451.
3. The Contractor shall obtain representative material samples to be used in testing.
4. For each material, which does not meet specifications, the Contractor shall pay for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. The Contracting Officer reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts.
2. Density testing will be taken at locations selected by the Contracting Officer at a minimum rate of 6 per 1000 LF of pipe. These tests shall be included in the contractor's bid price. Any materials failing such tests shall be recompact or removed, replaced and retested until satisfactory compaction is achieved at the Contractor's expense. Written results of all density tests will be submitted directly to the Contracting Officer by the testing laboratory for final approval.
3. The Contractor shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Contracting Officer.
4. For each test which does not meet specifications, the Contractor shall pay the cost of the test and shall replace all material included in that lift or section, replace with acceptable material, and compact to specifications, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedures.
6. Nuclear moisture density testing by probe methods will be acceptable for compacted layers not exceeding 12 inches in thickness.
 - a. Nuclear "backscatter" methods will be acceptable only for testing asphalt-paving layers not in excess of 3 inches in thickness.

- b. Only certified personnel will conduct nuclear testing.
 - c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.
- C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to Article 3.03A, Material Testing.
- D. Alternate methods of Compaction - The Contractor may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Contracting Officer's satisfaction.
- E. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.4 PROTECTION

- A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.
- B. As backfill progresses, the surface shall be graded so as to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.
- C. The Contractor shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction.
 - 1. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION 02228

SECTION 02446

BORING AND JACKING CONDUITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation for approach trenches and pits.
 - 2. Casing pipe.
 - 3. Carrier pipe.

1.2 REFERENCES

- A. American Railway Contracting Officering and Maintenance-of-Way Association:
 - 1. AREMA - Manual for Railway Contracting Officering.
- B. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- C. American Wood-Preservers' Association:
 - 1. AWWA C1 - All Timber Products - Preservative Treatment by Pressure Process.
 - 2. AWWA C3 - Piles - Preservative Treatment by Pressure Process.
- D. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- E. National Utility Contractors Association:
 - 1. NUCA - Pipe Jacking & Microtunneling Design Guide.
 - 2. NUCA - Trenchless Excavation Construction Equipment & Methods Manual.

1.3 DESIGN REQUIREMENTS

- A. Design bracing, backstops, and use jacks of sufficient rating for continuous jacking without stoppage, except for adding pipe sections and as conditions permit, to minimize tendency of ground material to "freeze" around casing pipe.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.
- B. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

- C. Installation Plan: Submit description of proposed construction plan, dewatering plan, and plan to establish and maintain vertical and horizontal alignment.
- D. Submit emergency response procedures to handle situations when conduit is compromised and jeopardizes integrity of installation or safety.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of casing or tunnel liner, carrier pipe, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY CONTROL

- A. Perform work in accordance with Commonwealth of Pennsylvania Department of Transportation Specifications, Publication 408, NUCA Trenchless Excavation Construction Equipment & Methods Manual, NUCA Pipe Jacking & Microtunneling Design Guide, and AREMA guidelines.

1.7 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this Section with minimum 5-years documented experience.
 - 1. Work Experience: Include projects of similar magnitude and conditions.
 - 2. Furnish list of references upon request.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Protect piping from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
- C. Accept system components on site in manufacturer's original containers or configuration. Inspect for damage.
- D. Use wooden shipping braces between layers of stacked pipe. Stack piping lengths no more than 3 layers high.
- E. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F (18 to 29 degrees C).
- F. Support casing and carrier pipes with nylon slings during handling.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.10 FIELD MEASUREMENTS

- A. Verify invert elevations prior to excavation and installation of casing.

PART 2 PRODUCTS

2.1 CASING AND JACKING PIPE MATERIALS

- A. Furnish materials in accordance with Pennsylvania Department of Transportation Publication 408.
- B. Steel Casing Pipe: ASTM A53/A53M, **35,000 psi** minimum yield strength, minimum wall thickness of **0.375 inch**, full circumference welded joints in accordance with AWS D1.1 to withstand excavation forces.

2.2 CARRIER PIPE MATERIALS

- A. Sanitary Sewer and forcemain: As specified in Section 02698.

2.3 GROUT AND COVER MATERIALS

- A. Mortar Sand: per Section 03600 - Grout.
- B. Portland Cement: per Section 03600 - Grout.

2.4 ACCESSORIES

- A. Casing Spacers
 1. For casings with a single carrier pipe, spacers to have four runners that center the carrier pipe and all four runners come in contact with the casing pipe. Casing spacers may be manufactured of polyethylene or stainless steel.
 2. For casings with a two carrier pipes, spacers on the bottom carrier pipe to have four runners that center at a minimum two runners contact with the casing pipe. Spacers on the top carrier pipe to have a minimum of three runners in which a minimum of one runner contacts the casing spacer of the bottom carrier pipe and a minimum of two runners come in contact with the top of the casing pipe. Casing spacers may be manufactured of stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify connection to existing piping system size, location, and invert elevations are in accordance with Drawings.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.

3.3 DEWATERING

- A. Intercept and divert surface drainage precipitation and groundwater away from excavation through use of dikes, curb walls, ditches, pipes, sumps or other means.
- B. Develop substantially dry subgrade for prosecution of subsequent operations.
- C. Comply with Commonwealth of Pennsylvania requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment pollution control.

3.4 PITS OR APPROACH TRENCHES

- A. Excavate approach trenches or pits in accordance with installation plan and as site conditions require.
- B. Ensure casing entrance face as near perpendicular to alignment as conditions permit.
- C. Establish vertical entrance face at least **1 foot** above top of casing.
- D. Install dewatering measures and excavation supports as specified in Section 02141.

3.5 CASING PIPE INSTALLATION

- A. Boring:
 - 1. Push pipe into ground with boring auger rotating within pipe to remove spoil. Do not advance cutting head ahead of casing pipe except for distance necessary to permit cutting teeth to cut clearance for pipe. Arrange machine bore and cutting head to be removable from within pipe. Arrange face of cutting head to provide barrier to free flow of soft material.
 - 2. When unstable soil is encountered during boring retract cutting head into casing to permit balance between pushing pressure and ratio of pipe advancement to quantity of soil.
 - 3. When voids develop greater than outside diameter of pipe by approximately **one inch**, grout to fill voids.
 - 4. When boring is obstructed, relocate, jack, or tunnel as directed by Contracting Officer.

- B. Jacking
 - 1. Construct adequate thrust wall normal to proposed line of thrust.
 - 2. Impart thrust load to pipe through suitable thrust ring sufficiently rigid to ensure uniform distribution of thrust load on full pipe circumference.

- C. Drilling and Jacking
 - 1. Use oil field type rock roller bit or plate bit made up of individual roller cutter units solidly welded to pipe which is turned and pushed for its entire length by drilling machine to give bit necessary cutting action.
 - 2. Inject high density slurry (oil field drilling mud) to head as cutter lubricant. Inject slurry at rear of cutter units to prevent jetting action ahead of pipe.

3.6 CARRIER PIPE INSTALLATION

- A. Clean, inspect, and handle pipe in accordance with Section 02698.

- B. Support pipeline within casing so no external loads are transmitted to carrier pipe. Attach supports to barrel of carrier pipe; do not rest carrier pipe on bells.

- C. Install end seal in compliance with the manufacturers' instructions.

3.7 TOLERANCES

- A. Do not over cut excavation by more than **1 inch** greater than outside diameter of casing pipe.

- B. Install casing pipe to vertical and horizontal alignment on Drawings within plus or minus **3 inches** prior to installation of carrier pipe.

- C. Install pipe bells with minimum **1/2 inch** clearance to casing.

3.8 FIELD QUALITY CONTROL

- A. Compaction Testing: As specified in Section 02228.

3.9 REMOVAL OF FACILITIES AND CONTROLS

- A. Remove temporary facilities for casing installation and jacking operations when complete.

END OF SECTION

SECTION 02510

ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt concrete paving.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM D1556 - Test for Density of Soil-in-Place by the Sand-Cone Method.
 - 2. ASTM D2922 - Test for Density of Soil-in-Place by Nuclear Testing.
- B. Commonwealth of Pennsylvania Department of Transportation publication 408 specifications, latest edition, and with local governing regulations if more stringent than herein specified.

1.03 PERFORMANCE REQUIREMENTS

- A. Paving and repaving accomplished under this Contract shall meet the finished grades, elevations and profiles shown on the Drawings.
- B. All thickness of pavement courses described herein or shown on the Drawings are after completion of compaction.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Submit certification of plant job mix formulas that have been approved by the PENNDOT.

1.05 QUALITY CONTROL

- A. Perform work in accordance with the PENNDOT Standard publication 408 specifications, as amended to date and as they apply to the following:
 - 1. Materials and batch plant requirements.
 - 2. Construction procedures except as modified herein.
 - 3. Weather and seasonal limitations except as modified herein.

A qualified paving contractor or subcontractor acceptable to the Owner and Contracting Officer shall perform paving work.

- C. Obtain asphalt concrete materials from same source throughout project.

1.06 ENVIRONMENTAL LIMITATIONS

A. Weather Limitations

1. Construct bituminous courses only when atmospheric temperature is above 40° F and when base is dry.
2. Aggregate base courses may be placed when air temperature is above 30° F and rising.
3. Do not pave when ground or aggregate base courses are frozen.

- B. Establish and maintain required lines and grades, including crown and cross-slope, for each course during construction.

- C. Take measures to control traffic to allow safe and expeditious movement of all traffic through the work area.

- D. Employ traffic control measures in accordance with the Commonwealth of Pennsylvania Department of Transportation.

- E. Restore existing paving outside the limits of the work, when damaged or in any way rendered defective by Contractor's operations or his movement of equipment, to its original condition at the expense of the Contractor.

PART 2 PRODUCTS

2.01 PAVING MATERIALS

- A. All paving materials shall conform to the referenced Article of the Standard Publication 408 Specification for Construction and Materials, Commonwealth of Pennsylvania Department of Transportation.

- | | | |
|----|--------------------|---------------|
| 1. | Subbase Aggregates | Section 703.3 |
| 2. | Base Course | Section 305 |
| 3. | Binder Course | Section 400 |
| 4. | Wearing Course | Section 401 |
| 5. | Tack Coat | Section 460 |

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare subgrade in accordance with Publication 408 of the Standard Specifications for Construction and materials, Commonwealth of Pennsylvania Department of Transportation.

3.02 FINISH GRADING OF THE SUBGRADE

- A. Grade parallel to the finish surface.
- B. Compact to 100% maximum density as determined in accordance with ASTM D1556.
- C. Remove all loose material from compacted subgrade surface immediately before placing base course.

3.03 CRUSHED AGGREGATE BASE COURSE

- A. Construct in accordance with Publication 408 the Standard Specifications for Construction and materials, Commonwealth of Pennsylvania Department of Transportation, and to the lines, grades and thickness indicated on the Contract Drawings.

3.04 BITUMINOUS PAVING, GENERAL

- A. Construct bituminous concrete paving to the lines, grades and thickness as shown on the Contract Drawings and as specified in Publication 408 the Standard Specifications for Construction and Materials, Commonwealth of Pennsylvania Department of Transportation.
- B. Examine the areas and conditions under which hot-mix bituminous concrete paving is to be installed.
- C. Do not proceed until unsatisfactory conditions detrimental to the proper and timely completion of the work have been corrected in a manner acceptable to the Contracting Officer.

3.05 PLACING THE MIX

- A. Place bituminous concrete mixture on prepared surface, spread and strike-off.
- B. Spread mixture at minimum temperature of 225° F.
- C. Place inaccessible and small areas by hand.
- D. Place each course to required grade, cross-section, and compacted thickness.
- E. Paver Placing
 - 1. Place in strips not less than 10-feet wide, unless otherwise acceptable to the Contracting Officer.
 - 2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
 - 3. Complete bottom course for a section before placing top course.

F. Hand Placing

1. Spread, tamp and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to the Contracting Officer.
2. Place mixture at a rate that will insure handling and compaction before mixture becomes cooler than acceptable working temperature.

G. Make joints between successive workdays to ensure continuous bond between adjoining work.

H. Construct joints to have same texture, density and smoothness as other sections of bituminous concrete course.

I. Clean contact surfaces and apply tack coat.

3.06 COMPACTING

A. Begin rolling when mixture will bear roller weight without excessive displacement.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling

1. Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge.
2. Check crown, grade, and smoothness after breakdown rolling, and repair-displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling

1. Follow breakdown rolling as soon as possible, while mixture is hot.
2. Continue second rolling until mixture has been thoroughly compacted.

E. Finish Rolling

1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
2. Continue rolling until all roller marks are eliminated and the course has attained maximum density.

F. Patching

1. Remove to full depth and replace paving areas mixed with foreign materials, and defective areas.

2. Cut-out such areas and fill with fresh, hot-bituminous concrete.
3. Compact by rolling to maximum surface density and smoothness.

3.07 PROTECTION

- A. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- B. Erect barricades to protect paving from traffic until mixture has cooled and attained its maximum degree of hardness.

3.08 FIELD QUALITY CONTROL

- A. General
 1. Test the in-place bituminous concrete courses for compliance with requirements for thickness and surface smoothness as specified in Article 1.05.A of this Section.
 2. Repair or remove and replace unacceptable paving as directed by the Contracting Officer and retest.

3.09 PROTECTION OF STRUCTURES FROM ASPHALT CONCRETE

- A. It shall be the responsibility of the Contractor to adequately protect the curb, gutter, and other adjacent structures when liquid bituminous material is being applied to the street surface.
 1. Contractor may use any method that is normal practice, via: Protective paper, courses of sand, etc.
 2. If any of the structures are defaced they shall be repaired at the Contractor's expense.
 3. Within the paving area, the Contractor shall protect manhole frames and covers and other similar utility street structures with paper or other means before applying bituminous material to the street.
 4. After the bituminous paving course has been completed, it shall be the Contractor's responsibility to remove the protective covering and examine the various street structures to see that they are unimpaired and that their covers are free and sit properly.

3.10 LINE AND SYMBOL PAINTING

- A. Shall be replaced in kind; layout and paint 4-inch wide white lines for parking areas and blue for handicapped lines, symbols and depressed curb area markings.

- B. Paint shall be applied when bituminous surface has "set" using highway mechanical marking machine.
- C. A one-coat application will be acceptable, provided complete cover is attained; otherwise apply an additional application.

3.11 WARRANTY

- A. For a period of one year after issuance of the Certificate of Substantial Completion, the Contractor shall promptly patch, maintain, repair, and/or replace any pavement, which settles or becomes damaged due to settlement or defective materials or workmanship.
 - 1. Areas to be repaired shall be cut out in a square or rectangular shape to the depth matching the top course.
 - 2. The vertical face of asphalt to be painted with asphalt emulsion prior to placing the asphalt concrete.
 - 3. If more than top course depth of 1-1/2 inch settlement has occurred, the pavement shall be removed to the subbase and subbase and/or binder and base course restored to proper grade before restoration of the wearing course.
 - 4. The centerline-finished grade, in any case, shall be as shown on the Contract Drawings.

END OF SECTION

SECTION 02523

CONCRETE WALKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Portland Cement concrete sidewalks.
- B. Removal of existing pavement and sidewalk.
- C. Base preparation.
- D. Placing, finishing, curing.
- E. Tolerances.
- F. Surface test.
- G. Warranty.

1.02 REFERENCES

- A. ASTM C-33 Concrete Aggregates.
- B. ASTM C-309 Liquid Membrane-Forming Compounds for Curing Concrete.
- C. ASTM D-1751 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

1.03 PERFORMANCE REQUIREMENTS

- A. Qualified Sidewalk Contractor
 - 1. All sidewalk work shall be performed by a qualified sidewalk contractor or sub-contractor acceptable to the Owner and the Contracting Officer.
 - a. Contractor may perform work if he can demonstrate he is qualified to the Contracting Officer's satisfaction.
 - 2. The Contractor shall submit in writing to the Contracting Officer the name and qualifications of the organization, which he proposes to employ for the sidewalk work.
- B. It shall be the Contractor's responsibility to perform all work within the prescribed temperature, moisture and weather limitations imposed herein and by Specification Section 03300.

1.04 SUBMITTALS

- A. None.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when air temperature is less than 40 degrees F or when aggregate base course or surface is frozen.
 - 1. Protect surface of freshly placed concrete from adverse weather conditions, rain, freezing and damage or defacement from vandalism.

1.06 WARRANTY

- A. For a period of one year after issuance of the Certificate of Substantial Completion, the Contractor shall promptly maintain, repair, and/or replace any sidewalk, which settles, cracks or becomes damaged due to settlement or defective materials or workmanship.
 - 1. If settlement or tilting of $\pm 1/4$ -inch or more has occurred, the sidewalk shall be removed and the subbase and/or base course restored to proper grade before restoration of the surface course.

1.07 REMOVAL OF EXISTING PAVEMENT AND SIDEWALK

- A. Pavement, including base courses, sidewalk, curb, and combination curb and gutter, and other miscellaneous surfaces, shall be removed for the full depth thereof.
 - 1. The Contractor shall use suitable equipment, tools, and methods for cutting and trimming, as well as removing the materials to the neat lines established by the Contracting Officer and shall not in any manner disturb or damage the sections of base or pavement to be salvaged or adjacent grass, sod, or other surfaces.
 - 2. Damage done by the Contractor's equipment or methods to those areas designated for salvaging shall be repaired and restored at the Contractor's expense.
 - 3. Where the old subgrade is satisfactory as to condition and elevation, special care shall be taken in the removal operation in order to avoid the disturbing of the old subgrade.
- B. Concrete sidewalks, drive aprons, etc., shall be removed to the nearest joint, and provided the joint is more than 1 foot from the edge of any utility trench.
- C. Concrete curb and combination curb and gutter may be neatly saw-cut and a portion removed provided that the remaining section is 4 feet long or longer.
- D. The materials removed in this operation shall be broken up and placed in the embankment or disposed of as directed by the Owner.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Sidewalk forms shall be either steel or wood, and shall be equal in depth to the thickness of the sidewalk.

2.02 CURING

- A. Curing shall be in accordance with Sections 03300 and 03370 either "Waterproof Paper Blankets"; "Quilted Covers"; "Polyethylene Coated Burlap Blankets"; "Polyethylene Curing Covers"; or "Membrane Curing Compounds".

1. If the above blankets or cover methods are used, after curing is complete, the concrete shall be sealed with a curing and sealer membrane compound.
 - a. The sealer to meet or exceed ASTM Specification C-309 Type 1D.
2. If a “Membrane Curing Compound” is used it shall meet the following requirements:
 - a. Membrane curing and sealing compounds may be either clear or white colored.
 - b. The selection of materials and methods shall provide protection from freezing.
 - c. Membrane curing and sealing compounds shall be applied in accordance with manufacturer's instructions.

2.03 CEMENT CONCRETE SIDEWALKS

- A. Cement concrete sidewalk shall be in accordance with Section 03300, Cast-In-Place Concrete.
 1. Air entrainment range of 5 to 7 percent.

2.04 REINFORCING

- A. Welded wire reinforcement shall consist of 6” x 6” 10 gage WWF.
 1. Metal supports for the welded wire fabric.

2.05 PREMOULDED JOINT FILLER AND SEALANT

- A. Expansion joint material shall be bituminous joint filler in accordance with ASTM D-1751.
- B. Joint sealant to be a gray or white color synthetic-rubber base-sealing compound.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Determine that subgrade has been properly graded and compacted.
- B. Determine that aggregate base course is properly compacted and graded to receive concrete.
- C. Determine that forms are correctly placed true to line and grade.
- D. The finished grade and alignment of sidewalk replacements to match existing conditions, jointing and shape that existed prior to removal, unless otherwise shown on the Drawings.

3.02 PREPARATION

- A. Prior to the start of each day's concrete placement, the sidewalk forms shall be placed and graded to the proper alignment and grade.
- B. Forms shall be held firmly in place using steel pins driven into the ground.
- C. Subgrade
 1. The subgrade shall be free from all bumps, depressions, standing water, roots, organic material and all deleterious material.
 2. The subgrade shall be graded, leveled and compacted to a smooth surface, parallel to the final surface.
 3. This subgrade shall be at a depth four inches below final grade.
 4. Except at or along driveways, the subgrade shall be an additional 2 inches in depth from that described above.
- D. Aggregate Base
 1. Furnish and install a 4-inch No. 57 aggregate base course under the sidewalk which shall be as specified in Section 02225, Trenching.
 2. Compact to 100% of the Method D Proctor Test (ASTM D-698).
- E. Where new or replacement cement concrete sidewalk is to meet existing sidewalk, the existing sidewalk shall be removed back to the first expansion or contraction joint.
- F. Tree roots which interrupt the proposed alignment and profile on the new sidewalk shall be removed to provide a 6-inch clearance between root and edge or bottom of sidewalk.
- G. Any valve boxes, curb boxes, manhole covers, etc., encountered or to be located in the sidewalk area shall be adjusted so that the cover is flush with the top surface of the sidewalk.
 1. All valve boxes, curb boxes, etc., shall be left in such a way that the covers are easily removed and the boxes shall function in the manner in which they were intended.
 2. All covers shall be cleaned and restored to their original condition, free from concrete and asphalt.

3.03 INSTALLATION

- A. Cement Concrete Sidewalks - One Course
 1. Concrete thickness shall be 4 inches, except that it shall be 6 inches through driveways, parking areas or roadways subject to vehicular traffic.

2. The final surface shall be leveled, floated and allowed to set slightly prior to the final troweling.

a. After troweling, the surface shall be lightly broomed and all joints and edges tooled.

B. Expansion Joints - Cement Concrete Sidewalks

1. Sidewalks shall have transverse expansion joints consisting of joint filler for full depth of concrete, spaced to no more than 15 feet apart or every third joint and 1/2 inch wide.

2. Sidewalks wider than 10 feet shall be divided by and 1/2-inch wide expansion joint of premoulded bituminous joint filler and sealed.

3. Match adjacent expansion or contraction joints in curbs or pavements.

4. Premoulded bituminous joint filler shall also be placed between sidewalk and curbs, pavements, buildings, steps, changes in direction, manhole frames, valve boxes and other fixed items within the concrete sidewalk area including any construction joints.

a. The top of the premoulded bituminous joint filler shall be set 1/4-inch below finished grade to allow room for the joint sealant.

b. After completion of finishing the concrete walk surface, the joint sealant shall be installed to completely fill all expansion joints.

C. Contraction Joints - One Course

1. The top surface shall be scored with contraction joints not less than 2 inches deep at intervals of 3 to 5 feet so that the finished walk will be marked in squares both longitudinally and transversely.

a. Coordinate joint layout with expansion joints, intersections and structures.

b. Contraction joints may be constructed using 1/4-inch by 2-inch steel plates inserted in the freshly screened concrete prior to finishing.

c. After finishing is complete and the initial set is started, remove plate and finish joints.

3.04 FINISH

A. Faces of concrete to remain exposed after final grading shall receive a smooth rubbed finish.

B. Concrete sidewalk surface to be finished with wood float, steel trowel and a broom finish.

1. Where walk grades are more than 5 percent and at ramps the broom finish shall leave striations approximately 1/8-inch deep.
2. After brooming, all edges and joints shall be edged with an edging tool of 1/4-inch radius.

3.05 CURING - CEMENT CONCRETE

- A. The edges and faces of concrete exposed by the removal of forms shall be protected immediately to provide these surfaces with continuous curing treatment equal to the method selected for curing the walk surface.
- B. The final concrete surface shall be cured with one of the types previously described in Article 2.02.
- C. The final concrete surface shall be sealed with one of the types of chlorinated rubber base curing and sealing agents described in Article 2.02.
- D. The selection of materials and methods shall provide protection from freezing temperatures.
- E. Concrete shall be kept cured and free of vehicles for at least five days.
 1. Where necessary to provide vehicular access, provide suitable bridging or plates (not supported by the fresh concrete) during the curing process.

3.06 TOLERANCES

- A. Finished subgrade shall be plus or minus 1/2-inch of its proposed grades.
- B. Finished aggregate base course shall be plus or minus 1/4-inch of its proposed grade.
- C. Finished walk surfaces shall be plus or minus 1/4-inch of its proposed grade.
 - a. Joints having more than 1/4-inch differential between one side or the other shall be corrected to be the same elevation.

3.07 SURFACE TEST

- A. After the concrete has hardened sufficiently to avoid marking the surface, the Contracting Officer shall test the surface, longitudinally and transversely, with a straight edge or string line 6 to 10 feet long (2 walk blocks long).
 1. Areas with high spots of more than 1/4-inch but not exceeding 1/2-inch shall be marked and ground down with an approved grinding tool such the surface deviations shall not exceed 1/4-inch in 6 to 10 feet.
 - a. The Contractor to restore the ground area to match the texture of the adjacent; walk surfaces.

2. Where surface deviations exceed 1/2-inch in 6 to 10 feet, the sidewalk shall be removed to the nearest joints and replaced at the Contractor's expense.

3.08 PROTECTION

- A. Any sidewalk, constructed or reconstructed, which is subsequently damaged due to negligence or activity of work or failure to protect surfaces from vandalism or becoming marked by vehicular or pedestrian traffic shall be removed and replaced by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 02528
CONCRETE CURBS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section describes materials and methods for construction of concrete curbing.

1.02 SUBMITTALS

- A. All materials delivered to the site will be certified to meet or exceed these specifications.

PART 2 - PRODUCTS

2.01 CEMENT CONCRETE

- A. Cement concrete shall be the strength shown on the contract drawings and meet the requirements Section 630 of the Commonwealth of Pennsylvania Department of Transportation Specifications.

2.02 SUBBASE

- A. Subbase shall be the type shown on the contract drawings.

2.03 EXPANSION JOINTS

- A. Expansion joints shall conform to ASTM Specification D-1751 for premolded asphalt expansion joint filler. The filler joint shall be 3/4" thick and the height 1/4" less than the full depth of the curb.

2.04 CURING

- A. Concrete curing shall be as specified in Section 711 of the Commonwealth of Pennsylvania Department of Transportation Specifications and the requirements of Section 03300.

2.05 REINFORCING

- A. Reinforcing shall be as specified on the contract drawings.

PART 3 - EXECUTION

Conventionally formed or machine formed concrete curb shall be formed to the size and shape shown on the construction plans.

3.01 CONVENTIONALLY FORMED CURB

- A. Casting Segments
 - 1. Curb shall be cast in segments having a uniform length of approximately 20 feet. Construction joints shall separate segments with provisions made at each joint for 1/4-inch expansion. When the curb is constructed next to cement concrete pavement, the

construction joint adjacent to the end of pavement slab shall line up with the pavement joint.

B. Expansion Joints

1. Expansion joints 3/4 inch in width shall be formed with premolded bituminous joint filler placed at intervals shown on the plans or specified by the Contracting Officer. The filler material shall be cut to conform to the cross section of the curb. When curb is cast adjacent to cement concrete pavement constructed with expansion joints, expansion joints in the curb shall be located at expansion joints in the pavement.

C. Forms

1. Forms shall be steel or wood, straight, free from warp, and of such construction that there will be no interference to inspection for grade or alignment. All forms shall extend for the full depth of the curb and shall be braced and secured adequately so that no displacement from alignment will occur during placing of concrete.

D. Concrete Placing & Vibrating

1. Concrete shall be placed in forms in accordance with Section 630 of the Commonwealth of Pennsylvania Department of Transportation Specifications.

E. Concrete Curing

1. Finishing and protection shall be as specified in Section 711 of the Commonwealth of Pennsylvania Department of Transportation Specifications and the requirements of Section 03370.

F. Protection

1. The Contractor shall keep the curb or curb and gutter clean, aligned, and protected from damage until final acceptance of the work. Any curb or curb and gutter damage prior to the final acceptance of the work shall be repaired or replaced at the Contractor's expense.

3.02 MACHINE FORMED CONCRETE CURB

A. Machine Forming

1. Curb or curb and gutter shall be machine formed to the proper line and grade. The Contracting Officer may require the Contractor to demonstrate that the specific equipment he proposes to use is capable of satisfactorily placing the concrete mix.
2. Any curb or curb and gutter placed outside of tolerance of 1/2 inch of the established line or 1/4 inch of the established grade shall be removed and replaced at the Contractor's expense.
3. Maximum placement slump shall be 1-1/2". Air contents shall be plus or minus 1.5% of design.

B. Contraction Joints

1. Contraction joints shall be formed or saw cut every 20 feet or as ordered by the Contracting Officer. When the curb or curb and gutter is constructed next to cement concrete pavement, the contraction joint in the curb or curb and gutter adjacent to the end of the pavement slab shall line up with the pavement joint. The saw cut or formed joints shall be left unfilled.

C. Expansion Joints

1. Expansion joints 3/4 inch in width shall be formed with "Premolded Joint Filler", at intervals shown on the plans or specified by the Contracting Officer. The filler material shall be cut to conform to the cross section of the curb or curb and gutter. When the curb or curb and gutter is machine formed adjacent to cement concrete pavement constructed with expansion joints, expansion joints in the curb or curb and gutter shall be located at expansion joints in the pavement.

C. Concrete Curing Finishing & Protection

1. Concrete curing, finishing and protection shall be as specified in Section 711 of the Commonwealth of Pennsylvania Department of Transportation Specifications and the requirements of Section 03300.

END OF SECTION 02528

SECTION 02698

SANITARY SEWERS AND FORCEMAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Underground pressure and gravity piping and fittings.
- B. Miscellaneous appurtenances.
- C. Requirements.
- D. Shop tests.
- E. Installation.
- F. Testing.
- G. Pipe schedule.

1.02 REFERENCES

- A. ASTM F477 - Elastomeric Seal, (Gaskets) for Joining Plastic Pipe.
- B. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
- C. ASTM D3139 - Joints for Plastics Pressure Pipes Using Flexible Elastomeric Seals.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data - Provide data, indicating conformance to ASTM/AWWA codes, pipe material, sizes, class, dimension, joint type and accessories.
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.
- D. Results of Shop Tests, if required.
- E. Manufacturer's Certification - Certify that (products) meet or exceed specified requirements.

1.04 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01330.
- B. Submit marked up record plans including record location of pipe connections, valves, and cleanouts, bends, tees, manholes, and rim and invert elevations.
 - 1. Invert elevations shall be the measurement of the pipe invert at a point where the pipe enters or exits a structure.
- C. Identify and locate on record drawings during construction the discovery of exposed uncharted existing utilities and services.

1.05 REGULATORY REQUIREMENTS

- A. All sheeting and bracing including the use of mobile shields shall conform to Public Law 91-596 (Williams Steiger Act). Occupational Safety And Health Administration Act (OSHA) of 1970 and its amendments and regulations.

1.06 FIELD MEASUREMENTS

- A. Prior to start of construction, verify by field measurements and elevations that existing conditions, structures and elevations are as shown on Drawings.
 - 1. Notify Contracting Officer of specific differences.
- B. Prior to start of construction, verify by exploratory excavations that existing underground utility locations and elevations are as shown on drawings prior to installation of crossing pipes or to confirm location and elevation of uncharted utilities.
 - 1. Notify Contracting Officer of location and elevation and allow Contracting Officer sufficient time to determine any changes required as a result of such exploratory excavation, prior to start of construction.

1.07 TEST REQUIREMENTS

- A. Requirements for pressure testing of all piping installed under this section are described in Section 02735.

1.08 COORDINATION

- A. Coordinate the work with local owners where affecting operation of existing structures and treatment facilities,

PART 2 PRODUCTS

2.01 GENERAL

- A. All products included in this Section shall conform to the requirements of the standard specifications referenced herein.
- B. Pipe material, pipe class and pipe sizes shall be furnished and installed as listed in the pipe schedule or as shown on the drawings.
- C. The underground process piping system shall be installed as shown on the Drawings.

2.02 MATERIALS

- A. Polyvinyl Chloride Pipe - Non-pressure
 - 1. Pipe and fittings shall be Type 1 polyvinyl chloride (PVC) Schedule 35, conforming to the requirements of ASTM D3034 with rubber gasket joints conforming to ASTM D3212 and ASTM F477.
- B. Polyvinyl Chloride Pipe - Pressure
 - 1. Pipe
 - PVC pipe shall conform to ASTM D-2241 and have elastomeric-gasket joints. Nominal diameter and dimension ratio shall be SDR 21 unless otherwise shown on the drawings.

2. Fitting

PVC fittings shall conform to ASTM D-2363, D-3212, D-2466, or D-2467 as appropriate.

C. HDPE Pipe

1. Provide SDR 9, IPS, ASTM D-3350, type PE3408, with a 200 psi rating pipe and fittings.
2. Both pipe and fittings shall carry the same pressure rating.
3. Pipe and fittings shall be butt fusible at 500⁰F +/- 10⁰F according to manufacturer recommended procedures

2.03 PIPE ACCESSORIES

A. Fittings

1. Same materials, class, coatings and linings as pipe unless under Article 2.02 it was specifically described otherwise.
2. Fittings molded or formed to suit pipe size and end design and in required tee, bends, elbow, couplings, adapters, and other configurations.

2.04 IDENTIFICATION

A. Each pipe length and fitting shall be clearly marked-with:

1. Manufacturer's name and trademark.
2. Nominal pipe size and class.
3. Material designation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on Drawings.
- B. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work.
 1. Any pipe or fitting which the Contracting Officer suspects is improper for the job shall be temporarily rejected, marked, and set aside for subsequent investigation to determine its conformity with the specifications.
 2. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the Contracting Officer, shall be pulled out and not installed.

- a. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the Contractor at his own expense shall then remove the pipe from the job site.

3.02 PREPARATION

- A. The Contractor shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc. to handle, cut and join the pipe.
- B. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02225.
- C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.
- D. All pipes, fittings and specials, which are to be installed in the open trench excavation, shall be properly bedded in and uniformly supported on pipe foundations of the type specified in Section 02225 and shown on the Drawings
 1. Stones 2 inches and larger shall be removed from the bearing surface of the pipe foundations.
- E. Pipe foundation bedding material shall be spread in maximum 8-inch layers and each layer shall be compacted up to the spring line of the pipe.
- F. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing as well as mechanical compactors.
- G. The Contractor shall perform his bedding operations with care to maintain line and grades.
- H. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings, or similar pipe projections.

3.03 LINES AND GRADES

- A. The Contractor shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades.
 1. The Contractor shall have personnel on duty or on standby call, at all times, who are qualified to check line and grade of pipe lines as they are installed.
- B. During construction, the Contractor shall provide the Contracting Officer, at this request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one or two roadmen or chainmen as needed at intermittent times.
- C. The Contractor shall carefully preserve bench marks, reference points and stakes established by the Contracting Officer or owner, and in case of willful or careless destruction by his own operations he will be charged with the resulting expense to

reestablish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.

- D. The Contractor may use laser equipment to assist in setting the pipe provided he can demonstrate satisfactory skill in its use.
- E. The use of string levels, hand levels, carpenters levels or other relatively crude devices for transferring grade or setting pipe are not to be permitted.

3.04 TOLERANCES

- A. Pipes shall be laid to the lines and grades shown on the Drawings.
- B. Minimum depth of cover shall be maintained as shown on the Drawings or as described herein.

3.05 INSTALLATION

- A. Installation of plastic pipe to be in conformance with ASTM D2774, except as modified in this Section or referenced Sections or as shown on the Drawings.
- B. The Contractor shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted.
 - 1. Transportation from storage areas to the trench shall be restricted to operations, which can cause no damage to the pipe or lining or castings.
- C. The pipe shall not be dropped from trucks onto the ground or into the trench.
- D. Each pipe section shall be placed into position in the trench on the pipe bedding in such manner and by such means required to cause no injury to the pipe, persons or to any property.
- E. The method of laying and jointing the pipe shall be in accordance with the recommendations of the manufacturer.
 - 1. Each pipe shall be aligned with that already in place, forced home completely with horizontal axial movement and held securely in position.
 - 2. The bell of each pipe length to be laid in the same direction the installation is proceeding.
- F. At the joints, enough depth and width shall be provided to permit the pipe layer to reach entirely around the pipe so that the joints may be made in accordance with the manufacturer's recommendations.
- G. Pipes, fittings, and specials shall be firmly bedded in the pipe foundation and shall have full bearing throughout their entire length, which shall be accomplished by combination of shaping the bedding and adequately compacting the pipe bedding and backfill under and around the pipe to the spring line of the pipe.
 - 1. The remaining backfill shall be installed in accordance with Section 02225 and 02228.

- H. Pipe laid in normal trench excavation shall not be laid on wood blocking.
- I. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension.
- J. Unless otherwise shown on the Drawings, the minimum total finished cover over the top of the pipe barrel of all pressure pipe shall be 4'-0".
- K. Refer to Section 02225 for other installation guidelines and requirements.
- L. To deflect a pipe joint, first join the pipe in the proper manner and deflect the pipe within the allowable deflection recommended by the manufacturer.

3.06 BRACING AND BLOCKING

- A. All bends, tees, crosses, plugs, etc., in all pressure piping systems shall be braced and blocked with wood and then anchored with concrete thrust blocks so that there will be no movement of the pipe in the joints due to the internal or external pressures.
 - 1. In situations where the placement of required thrust blocks conflicts with other piping installations as shown on the Contract Drawings, lock joints or tie rods may be allowed, with the Contracting Officer's approval, on a case specific basis.
- B. The concrete shall be placed around the fittings and completely fill the space between the fittings and walls of the trench, from 6 inches below the fittings of pipe to 12 inches above the fittings and in accordance with the dimensions and details shown on the Drawings.
- C. The anchor concrete shall be so placed that the bell and spigot joints or other joints may be tightened, if necessary.
- D. Steel ties shall be used only where shown on the Drawings.
- E. Prior to installation of the concrete anchor, the Contractor shall wrap all fittings with a minimum of 8-mil thick polyethylene.
- F. Cast-in-Place concrete used in constructing concrete thrust blocks shall conform to requirements for Type 'C' concrete specified in Section 03300.

3.07 TEMPORARY PLUGGING

- A. At all times when pipe laying is not actually in progress, the open ends of the pipes shall be closed temporarily with pipe plugs or by other means such that there is no possibility of any water or foreign material entering the line.
- B. If water is in the trench when work is resumed, the plugs shall not be removed until the water has been removed and work can proceed in a dry stable trench.

3.08 CLEANING PIPELINE

- A. At the conclusion of the work, the Contractor shall thoroughly clean all new pipes by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered during the construction period.
 - 1. If, after this cleaning, any obstructions remain, they shall be corrected to the satisfaction of the Contracting Officer.
 - 2. Pipes shall be flushed at a minimum rate of 2.5 feet per second for a suitable duration.
- B. Where required the Contractor should use mechanical methods to clean pipes when flushing does not remove all obstructions or material.

3.09 TESTING

- A. Piping systems shall be tested in accordance with Section 02735.

END OF SECTION

SECTION 02734

SANITARY SEWER MANHOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory design and manufacturer of manhole sections and accessories.
- B. Quality assurance and control.
- C. Field installation of manholes.
- D. Connection to piping.

1.02 REFERENCES

- A. ASTM C-150 --Portland Cement.
- B. ASTM C-443 - Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets.
- C. ASTM C-478 - Precast Reinforced Concrete manhole Sections.

1.03 SUBMITTALS

- A. Submit shop drawings of typical manufactured wall sections and bases proposed for this project, including joint design and related details for field assembly.
 - 1. Include certification of conformance with Contract Documents and the appropriate ASTM Specification.

1.05 DESIGN

- A. All manholes shall be designed by a licensed Professional Contracting Officer registered in the State of Pennsylvania, and engaged by the manufacturer.
 - 1. All dead loads, live loads, flotation, erection, temperature and anchorage stresses shall be considered.
 - 2. The calculations shall be prepared in a neat and legible manner, sealed by the licensed Professional Contracting Officer performing the calculations.
 - 3. For design, groundwater shall be assumed at the top of the vault and the design shall provide for a 15% factor of safety against flotation.
 - 4. Manhole shall be designed to withstand H₂O loadings.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE BASES

- A. Design and manufacture of precast concrete bases for manholes shall conform to the requirements of this Section and ASTM Specification C-478.

1. Bases shall conform to the dimensions indicated on the Drawings, and the horizontal joint at the top of the base shall be compatible with that of the precast wall section.
- B. Precast bases shall be manufactured to contain openings in the wall, of minimum size, to receive the ends of the installed pipe.
 1. Openings shall be accurately positioned to conform to line and grade of the connecting sewer.

2.02 PRECAST CONCRETE WALLS AND MANHOLES TOPS

- A. Design and manufacture of precast concrete walls shall conform to the requirements of this Section and ASTM Specification C-478.
- B. Precast concrete walls shall be constructed using straight, circular pipe sections and eccentric cone sections if manhole steps are required and concentric cone sections where no steps are required.
- C. If required, manhole steps shall be cast integrally with or grouted solid into the precast wall units as specified in a later article.
 1. No lifting holes are permitted in the precast units.
- D. Unless shown otherwise on the Drawings, all tongue-and-groove (or male and female) joints in the precast wall, including the joint at the top of the base, shall be made up using the "Snap-On" Type "O"-ring gasket, and shall conform to ASTM Specification C-443; and joint taper shall not exceed 3-1/2 degrees.
 1. The precast sections shall be provided with a special groove (cast into the male end) to receive and hold the gasket in position during joint assembly.
 2. Joints may also be made up by using Butyl joint sealant rope material in lieu of the "O"-ring gasket.
- E. If required, precast reinforced concrete slab tops for manholes shall be manufactured in accordance with ASTM Specification C-478.
 1. Slab tops shall be set in a full bed of mortar.

2.03 FRAMES AND COVERS

- A. Frames and covers shall be of the make, style, opening, height, weight, and other designation specified herein or shown on the Drawings.
- B. Material shall be gray cast iron conforming to ASTM Specification A-48, Class 30; or shall be ductile cast iron conforming to ASTM Specification A-536, Grade 60-40-18.

- C. Unless otherwise scheduled, frames and covers shall be heavy duty, non-penetrating pick hole type of non-rocking design, and shall have machined bearing surfaces to prevent rocking and rattling under traffic loads.
 - 1. Covers shall have cast in, 1-½ inch wide, raised letters, the words shall be "SANITARY SEWER" or as indicated on the Contract Drawings.
- D. All manhole covers shall be furnished with "O"-ring rubber gaskets.
- E. Surface finish shall be smooth and well cleaned by shot blasting or by some other approved method.
- F. Frames and covers shall have clear opening of 24-inch diameter.

2.04 MANHOLE STEPS

- A. Manhole steps are to be provided in manholes.
 - 1. Steps are to be cast in or grouted solid into the precast units at intervals of 12 inches.
 - 2. Steps shall be in conformance with OSHA requirements having drop front or equivalent.
 - 3. Bolted-on type is not acceptable.
 - 4. Manhole steps to be as shown on Contract Drawings.

2.05 MASONRY WORK AND GRADE RINGS

- A. The manhole frame shall be supported and adjusted to finished grade using precast concrete grade rings. Support and adjust manhole frames. Grade rings shall conform to ASTM Specification C-478, and shall be carefully set in full bed of mortar.

2.06 PIPE SEALS

- A. Sanitary sewer connections between manholes and pipes shall be made with flexible rubber seal, cast into the concrete.

2.07 DROP SECTIONS

- A. Whenever the invert of a pipe entering a manhole is 24 inches or more in height above the invert of the lowest pipe leaving the manhole, it shall be connected to the manhole with drop connection as shown on the Drawings.
- B. Pipe Fittings, specials and adaptors required for the outside drop section shall be of Ductile Iron.
- C. The manhole shall be a minimum of 4 feet in diameter and be constructed in the normal manner, except that a straight clean-out pipe shall be connected through the wall, all as detailed on the Drawings.

- D. After installation of the outside drop section and pipe connections into the manhole, the entire vertical, outside assembly shall be encased in concrete, as shown, using concrete Mix 'C'.

2.08 CONCRETE

- A. Cast-in-place concrete used in constructing manhole bench walls and encasing outside drop sections shall conform to Class A as specified in Section 03300.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subgrade elevations for manhole bases are correct and excavation is dewatered.
- B. Verify that rejected (tagged) units have been removed from the site.

3.02 PREPARATION

- A. Provide foundation mat to support manhole base.
 - 1. Mat shall be twelve (12) inches minimum depth of No. 57 stone and shall bear on sound undisturbed earth; excavate and remove subgrade material as necessary to reach sound stratum.
- B. Mat diameter shall be a minimum of one foot greater than outside diameter of manhole base, and shall be compacted to a uniform, level surface.

3.03 INSTALLATION

- A. Precast base shall be accurately located and uniformly supported on the foundation in a level position.
- B. Install required manhole wall sections in properly oriented position; follow manufacturer's instructions for joining together each section using the "snap-on" "O"-ring gasket joint.
 - 1. Pack joints with grout in accordance with Article 2.02.
- C. All precast units shall be laid-up plumb and level to form a vertical manhole structure at each location.
- D. Connect ends of pipe to manholes as shown on the contract drawings and specified in Article 2.06.
- E. Construct flow channels and bench walls in bottom of manholes, shaped to follow details on the Drawings.

1. Flow channels shall match inverts and size of pipes, creating a channel of gradual slope and curvature such that smooth, interrupted flow through the manhole is assured.
 2. Extend channel wall vertically up to top of highest (flowing) pipe so as to form the bench wall.
 3. Bench surface shall extend horizontally to manhole walls, with slight pitch toward flow channel.
- F. Flow channels and bench walls shall be constructed of concrete as specified, although half-sewer pipe sections may also be utilized to form portions of the flow channel.
1. All exposed concrete surfaces shall receive a steel trowelled finish except horizontal surface of bench walls shall then be brushed finished.
- G. Perform masonry work, including use of grade rings, at top of cone-shaped wall section so as to adjust and support cast iron frame to finished grade, in accordance with requirements of Article 2.05.
- H. Frames shall be firmly seated in full bed of mortar and be positioned to conform to the adjacent finished grade, or to the specific elevation shown on the Drawings.
1. Frames to be set parallel to surface slopes.
 2. Covers shall seat uniformly in any position in the frame without rocking.
 3. In pavements and shoulder areas, set frame 1/2 inch below finished grade.

3.04 BACKFILLING AND LEAKAGE TESTING

- A. Where outside drop sections are constructed, encase outside pipes in concrete, as shown on Drawings, and in conformance with Article 2.07.
- B. Carry out backfilling operations in conformance with Section 02225, being careful to provide full support under connecting pipes using compacted bedding material specified for the sewer piping.
- C. Manholes shall be watertight.
1. All leaks shall be permanently sealed in an approved manner.
 2. Leakage tests of manholes will be accomplished in conjunction with leakage tests of connecting sewer lines under Section 02735.

END OF SECTION

SECTION 02735

LEAKAGE TESTS OF SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Leakage Testing by Air Pressure Methods.
- B. Deflection Testing.
- C. Manhole Testing.
- D. Hydrostatic Testing Pressure Pipe.

1.02 REFERENCES

- A. Uni-Bell Plastic Pipe Association - UNI-B-6-79 low pressure air testing.

1.03 TEST REQUIREMENTS

- A. Backfilling of the sewer trench to ground or road surface shall be in place and completed, except for final paving, prior to start of testing of each Section of sewer.
- B. Testing shall be completed prior to final paving and final restoration.
- C. Low pressure air test shall not exceed drop of 1.0 psig for time period listed in attached Table 1.
 - 1. Test procedure shall conform to ASTM C828 except as modified by the UNI-Bell Plastic Pipe Association Publication UNI-B-6 for low-pressure air testing of installed sewer pipe.
 - a. Refer to Table No. 1 for maximum allowable time for a 1.0 psig drop.
- D. Maximum test length shall not exceed 1,000 feet.
 - 1. In the case of sewers laid on steep grades, the length of line to be tested at any one time may be limited by the maximum allowable internal pressure on the pipe and joints at the lower end of the line.
 - a. The recommendations of the pipe manufacturer shall be followed in this regard.
- E. The Contracting Officer or approved representative shall witness all tests.

1.04 SUBMITTALS

- A. None.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit Documents Under Provisions of Section 01700.

B. The information is attached to the end of this Section.

1. Air Pressure Testing of New Sewers Form
2. Table No. 1 - Low Pressure Air Testing of Sewers.

1.06 FIELD MEASUREMENTS

A. Air Pressure Testing

1. Measure length of section to be tested.
2. Measure height of ground water above top of pipe.
3. Measure time interval and pressure drop.
4. Record measurements on LDG form for Air Pressure testing.

1.07 COORDINATION

A. Coordinate maintenance of traffic with local authorities.

PART 2 PRODUCTS

2.01 WATER SUPPLY

A. Not used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Backfill has been in place the required time before start of test.
- B. No connections to live sewers or live laterals have been made unless directly replacing existing sewer.

3.02 PREPARATION

- A. Pipelines and manholes have been flushed and cleaned of all debris, stones, silt, etc. such that all surfaces of pipe and manholes are visible.
- B. The Contractor shall have on the job all the proper tools, pipe plugs, air bags, gauges, pumps, wires, compressors, etc. necessary to properly test the pipe and manholes.
- C. The Contractor shall determine the height of ground water above the top of pipe at the upper end of the Section(s) to be tested.

3.03 TESTING

A. Deflection Testing Mandrel

A mandrel shall be pulled through each reach of sewer. Any pipe deflected sufficiently to prevent passage of the mandrel shall be removed and replaced at the contractor's expense. Allowable deflection shall be limited to 7-1/2 percent of the pipe inside diameter.

B. Manhole Testing – Vacuum Testing

Either vacuum testing shall test completed manholes. Where possible, manholes shall be tested prior to backfilling. Manholes, which fail testing, shall be repaired and retested.

a. Vacuum Test

The vacuum test shall be completed by plugging all sewer lines into the manhole and drawing a vacuum of ten (10") inches of mercury. The test shall start upon reaching the above vacuum. Test duration shall be in accordance with the following table:

VACUUM TEST TABLE

<u>Manhole Diameter</u>	<u>Test Duration</u>
48"	60 seconds
60"	75 seconds
72"	90 seconds

At the end of the test period, record the vacuum drop. If the drop is greater than one (1") inch of mercury, the manhole is not acceptable and must be repaired. If the vacuum drop is less than one (1) inch of mercury, the manhole is acceptable.

If the section fails to meet the above requirements for pipes and manholes, the Contractor shall determine at his own expense, the source, or sources of leakage, and he shall repair or replace all defective materials and/or workmanship to the satisfaction of the Contracting Officer.

- a. The extent and type of repair as well as results, shall be subject to the approval of the Contracting Officer.
- b. The completed pipe installation shall then be retested and required to meet the leakage requirements of this test.

C. Sewer Testing - Low Pressure Air Testing

1. Prior to start of test permanently repair all visible leaks.
2. Isolate each section to be tested with airtight plugs.
3. The maximum allowable drop in pressure from the test pressure shall be 1.0 psig during the minimum holding time.
 - a. Test pressure shall be calculated using the following equation:

$$P \text{ (psig)} = 3.5 + H/2.31$$

where:

P = Test pressure, maximum of 9 psi.

H = Height of groundwater above invert in feet.

5. All pressurizing equipment used for low-pressure air testing shall include a regulator or relief valve set no higher than 9 psig to avoid over-pressurizing and displacing temporary or permanent plugs.
 - a. In no case should the starting pressure exceed 9.0 psig.
 - b. If the average vertical height of groundwater above the pipe invert is more than 15 feet, the section so submerged is to be tested by the infiltration method as described for manholes.
6. Either mechanical or pneumatic plugs may be used.
 - a. All plugs shall be designed to resist internal testing pressures without the aid of external bracing or blocking.
 - b. If pneumatic plugs are utilized, a separate hose shall also be required to inflate the pneumatic plugs from the above ground control panel.
 - c. Plug the upstream end of the line first to prevent any upstream water from collecting in the test line, especially in high groundwater situations.
 - d. When plugs are being placed, the pipe adjacent to the manhole shall be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole.
 - e. A probable point of leakage is at the junction of the manhole and the pipe, and this fault may be covered by the pipe plug, and thus not revealed by the air test.
7. To facilitate test verification by the Contracting Officer, all air used shall pass through a single, above ground control panel.
 - a. The above ground air control equipment shall include a shut-off valve, pressure regulating valve, pressure relief valve, input pressure gauge, and a continuous monitoring pressure gauge having a pressure range from 0 to at least 10 psi.
 - b. The continuous monitoring gauge shall have minimum divisions of 0.10 psi and an accuracy of + or - 0.04 psi.
 - c. The equipment to include a separate certified test gauge for periodic checking of the accuracy of the basic equipment gauges.

8. Two separate hoses shall be used to: (1) connect the control panel to the sealed line for introducing low-pressure air, and (2) a separate hose connection for constant monitoring of air pressure build-up in the line.
 - a. Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater above pipe, but not greater than 9.0 psig.
 - b. After a constant pressure of 4.0 psig is reached, the air supply shall be throttled to maintain that internal pressure for at least 2 minutes or until the temperature of the entering air to equalize with the temperature of the pipe wall.
 - c. When temperatures have been equalized and the pressure stabilized at 4.0 psig, the air hose from the control panel to the air supply shall be shut off or disconnected.
9. The continuous monitoring pressure gauge shall then be observed while the pressure is decreased to no less than 0.5 psig (greater than the average back pressure of any groundwater over the pipe).
 - a. At a reading of 3.5 psig, timing shall commence with a stopwatch or other timing device that is at least 99.8% accurate.
10. If the time shown in Table No. 1 (refer to Table at the end of this Section) for the designated pipe size and length elapses before the air pressure drops 1.0 psig, the section undergoing test shall have passed the leakage test.
 - a. The test may be discontinued once the prescribed time has elapsed even though the 1.0-psig drop has not occurred.
11. If the pressure drops 1.0 psig before the appropriate time shown in Table No. 1 has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test.
12. If the section fails to meet the above requirements, the Contractor shall determine at his own expense the source, or sources of leakage, and he shall repair or replace all defective materials and/or workmanship to the satisfaction of the Contracting Officer.
 - a. The extent and type of repair as well as results, shall be subject to the approval of the Contracting Officer.
 - b. The completed pipe installation shall then be retested and required to meet the requirements of this test.
13. The times shown in Table No. 1 are for the length of main sewer tested.
 - a. For lengths other than those shown, the time to be interpolated.

- b. The tables do not have any reduction of time for length of laterals connected to the section of sewer being tested since it normally is not significant
- c. For all precise calculation of time allowance including laterals, refer to UNI-Bell UNI-B-6 publication and the sample calculations and formula shown at the rear of this section.

D. Testing Pressure Sewer Piping:

1. Hydrostatic Leakage Test:

- a. Hydrostatically test each portion of pressure piping, including valved section, at 1.5 times working pressure of piping based on elevation of lowest point in piping corrected to elevation of test gauge.
- b. Fill section to be tested with water slowly, expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled and raise pressure to specified test pressure.
- c. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.
- d. Correct visible deficiencies and continue testing at same test pressure for additional 2 hours to determine leakage rate. Maintain pressure within plus or minus 5.0 psig of test pressure. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.

e. Compute maximum allowable leakage by the following formula:

$$L = \frac{SD\sqrt{P}}{C}$$

L = allowable, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of pipe, in inches

p = average test pressure during leakage test, in psig

C = 133,200

When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

- f. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

LARSON DESIGN GROUP, INC.

Job No. _____
 Contract No. _____

AIR PRESSURE TESTING OF NEW SEWERS
TABULATION SHEET

Project: _____ Weather: _____

Project or Subdivision _____

Contractor _____

Section Tested _____

_____ Linear Feet of _____ " Diameter _____ Pipe with _____ Joints

Groundwater Observation = _____ feet above the top of pipe

- a. Groundwater Head = _____ 2.3 = _____ psig
- b. Test Head = _____ = _____ psig (a+b)
- Total Test Pressure = _____ (Max. 10 psi)

Time of Start	Time of Finish	Interval in Minutes	Initial Air Pressure (psig)	Final Air Pressure (psig)	Total Loss of Pressure (psig)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Pass _____ Fail _____ (Refer to Section 02735 for requirements and for method of calculation.)

Remarks _____

LARSON DESIGN GROUP, INC.:
 By: _____
 Title: _____

CONTRACTOR:
 By: _____
 Title: _____

TABLE NO. 1

LOW PRESSURE AIR TESTING OF SEWERS

Pipe Diameter (inches)	*Shortest Time (min:sec)	Length for Shortest Time (ft.)	Time for Longer Length (sec.)	Time (min:sec) for Length (L) Shown					
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29

*Time allowed for 1.0 psig drop in pressure.

END OF SECTION

SECTION 02980

SITE REHABILITATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Restore site to pre-construction conditions or as modified herein or by other sections.
- B. Site rehabilitation of lawns shall be reestablished or replaced with new materials.
- C. Topsoil, fertilizer, seeding, mulching and planting.
- D. Owner Furnished Material.
- E. Site rehabilitation of walls, fences, ditches, drains, culverts, drives, posts, and all other artificial features shall be repaired, restored or replaced to the same or superior condition which existed prior to construction and in accordance with this Section and related sections.
- F. Site modifications and development to meet new conditions.
- G. Remove and dispose of all excess materials, equipment, trash and debris used for, or resulting from, the work included in this Section. Refer to Section 02225.

1.02 REFERENCES

- A. The American Association of Nurserymen Standards.
 - 1. ANSI Standard 2-60.1, "Nursery Stock".
- B. Soil Conservation District of the Department of Agriculture.

1.03 QUALITY CONTROL

- A. Areas and features to be restored.
 - 1. All areas, including natural features occurring thereon, which are damaged or disturbed by the Contractor's operations, shall be restored, repaired or replaced to the same or superior condition which existed prior to construction or as modified herein or as shown on the Drawings.
 - 2. Artificial features shall be restored equal to a new condition or as modified herein or as shown on the Drawings.

1.04 SUBMITTALS

- A. Submit under Provisions of Section 01330.

- B. Additional Topsoil - Submit sieve analysis and characteristics of topsoil as listed in Part 2 - Materials.
- C. Seed mixture.

1.05 PACKING AND SHIPPING

- A. All seed furnished for this project shall be delivered in standard size unopened bags of the vendor, showing weight, mixture, vendor's name and guaranteed analysis.

1.06 STORAGE

- A. Seed shall be properly stored in dry conditions at the site of the work.
 - 1. Any seed damaged or spoiled during storage shall be replaced by the Contractor.

1.07 ENVIRONMENTAL CONDITIONS

- A. Topsoil shall not be delivered or placed in a frozen or muddy condition.
- B. Seeding is to be done on dry or moderately dry soil.
 - 1. Seeding is to be done when the wind velocity does not exceed 5 miles per hour.

1.08 SCHEDULE

- A. The Contractor shall coordinate seeding with Owner, to take place during the periods of May 1st to June 15th, or August 15th to October 1st.
 - 1. Seeding may be conducted under unseasonable conditions without additional compensation, and at the option and full responsibility of the Contractor.

1.09 GUARANTEE

- A. Any new, reestablished, replaced or disturbed plant material that fails to respond properly within the one-year guarantee period shall be replaced as specified above at the Contractor's expense.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Topsoil
 - 1. Topsoil shall be natural, fertile, friable agricultural soil capable of sustaining healthy vegetative growth.

2. Topsoil shall meet the following gradation requirements free of stones, roots, sticks and other foreign substances:

Grain Diameter	Sieve Size	Percent Passing by Weight
6.3 mm	6.3 mm	100
4.75 mm	No. 4	60 to 85
0.075 mm	No. 200	20 to 45
0.002 mm	---	7 to 27

- a. Topsoil shall contain less than 52% sand.

3. The pH of topsoil shall be between 5.0 and 7.0.
4. Topsoil shall contain no less than 6.0% organic matter.
5. Topsoil may be from previously excavated, stockpiled and protected materials, provided the materials meet the requirements for topsoil.

C. Fertilizer

1. General Fertilizer

- a. Fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer.
- b. All fertilizer shall contain a minimum of 10% nitrogen, 6% available phosphorous and 4% potash.
- c. Other commercially available fertilizers, such as 20-10-10 and 12-6-6, may be utilized provided that spreading rates are adjusted to provide the aforementioned minimum requirements for nitrogen.

D. Seed

1. All seed shall be fresh, recleaned and of the latest crop year.
2. Each component shall meet or exceed the minimum State and Federal requirements for purity and germination for that component.
3. The weed content of each component shall not exceed 0.1%.
4. The following seed mixture is suggested for lawns or cultivated (landscape) areas:

<u>Percent By Weight</u>	<u>Variety</u>	<u>Purity</u>	<u>Germination</u>
50	Kentucky Blue Grass	85%	80 days
20	Red or Chewing Fescue	97%	80 days
30	Red Top	92%	90 days

- a. Variations may be recommended by qualified personnel, but shall not be used without approval by the Contracting Officer.

5. For uncultivated areas furnish perennial rye grass seed.

- E. Mulch for Seeded Areas - Mulch shall be oat, wheat or rye straw, free from noxious weeds and other materials, which may interfere with the establishment of a healthy stand of grass.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Determine that surface area is ready for fine grading and/or to receive topsoil and seeding or plantings.

- 1. Refer to Sections 02110 and 02225.

3.02 PREPARATION

- A. Fine Grading - Areas requiring topsoil shall be fine graded to within 3 inches of finished grade to provide a minimum compacted thickness of 3 inches of topsoil at all locations.

- 1. All such areas, whether in cut or fill, shall be raked to a depth of 1 inch, be parallel to finished grade as shown or required and shall be free of all stones, larger than 1 inch, roots, rubbish, and other deleterious material.

3.03 INSTALLATION

- A. Areas to be developed

- 1. when the project site is to be modified and developed to meet new conditions, the Contractor shall perform all required grading, top soiling, fertilizing, seeding, planting, mulching and maintenance of areas, all in accordance with the Drawings and as specified herein.

- 2. Unless shown otherwise on the Drawings, the entire unpaved area within the limits of disturbance limits and within the overall areas excavated and backfilled shall be so developed.

- 3. New landscaping work and artificial features, if any, are shown on the Drawings and specified elsewhere.

- B. The Contractor shall reestablish all existing cultivated or landscape items, trees, shrubs, vines and ground covers as practicable.
 - 1. He shall provide additional or modify existing vegetation, as shown on the Drawings.
 - 2. Existing trees, plants, shrubs, saplings, ground cover, vines, etc., which are disturbed or damaged by the Contractor's operations shall be replaced with new plant materials.

3.04 TOPSOILING

- A. Topsoil shall be furnished and spread in the required areas to a depth of approximately 4 inches.
 - 1. Stockpiled topsoil may be used if it is acceptable to the Contracting Officer.
 - 2. In the event this topsoil is not satisfactory, or is inadequate to cover the required areas, the Contractor shall furnish the required amount of satisfactory topsoil from approved sources off the site.
- B. The soil shall be uniformly compacted with a light hand roller to a final depth of not less than 4 inches.
 - 1. When finished, the surface shall conform to the finished grades shown or required and shall have a smooth pulverized surface at the time of seeding.
 - 2. Any irregularities shall be corrected before the fertilizer and seed are placed.
 - 3. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Contractor's expense.

3.05 FERTILIZING

- A. The fertilizer shall be uniformly spread by a mechanical spreader at the rate of 25 pounds per 1000 square feet.
 - 1. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.
 - 2. Other commercial fertilizers, such as 20-10-10 or 12-6-6 may be used at rates adjusted to provide the same quantity of nitrogen per 1000 square feet.

3.06 SEEDING

- A. Seed shall be applied at a rate of not less than five pounds per 1000 square feet, using a mechanical spreader.

1. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.
- B. The process of spraying grass seeds, water, fertilizer and mulch known as hydro seeding or hydro mulching may be utilized provided that water hazards are minimized.
1. Presoaking, the spraying of the materials and watering after spraying shall be in strict accordance with the manufacturer's instructions.
 2. All materials, protection, maintenance, etc., shall be in conformance with this specification.
 3. The mulch may be a wood fiber material compatible with the spray equipment.

3.07 MULCHING AND PROTECTION

- A. The Contractor shall protect and maintain seeded areas to assure a full even stand of grass.
1. Immediately after seeding and rolling, the Contractor shall apply oat, wheat or rye straw, free from-noxious weeds, as a mulch, to a loose depth of about 1 inch.
 2. The Contractor shall perform all watering and reseeding as necessary for a minimum of 30 days and until final acceptance of the Contract, to ensure the establishment of a uniform stand of specified grasses.

3.08 MAINTENANCE

- A. Any portion of seeded areas failing to produce a full uniform stand of grass from any cause, shall be reseeded at full rate and refertilized at one-half rate and protected and maintained until such a full stand has been obtained.

3.09 RESTORATION OF UNCULTIVATED LANDS

- A. Areas of uncultivated land shall be restored as follows:
1. The disturbed surfaces shall be rough-graded to the original elevations (± 1 inch) and general appearance which existed prior to construction (or to the new elevations-and grades which are required), all debris, loose stones over 1 inch, boulders, etc., being removed in the process.
 2. The surface shall then be seeded with perennial rye grass, being spread at the rate of
1 lb. per 800 square feet.
 3. The area need not be raked or rolled after completion of seeding.

3.10 SPECIAL CONDITIONS

- A. Damaged Trees - Vegetation which has been damaged by site preparation activities and deemed non-functional by the owner or Contracting Officer, shall be replaced by the Contractor with vegetation of the same caliper, genus and species at no additional compensation to the Contractor.

END OF SECTION

SECTION 03300

CONCRETE FOR UTILITY CONSTRUCTION

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Cast-in-place cement concrete.
2. Reaction and support blocking.
3. Cradles and encasement.

1.02 SUBMITTALS

A. Certificates:

1. Submit certification from the concrete producer attesting that the cement concrete conforms to Section 704, Specification 408 Specifications for the class of concrete being used.
2. Submit certified results of compressive strength tests performed by an independent testing laboratory.

B. Shop Drawings:

1. Submit detailed shop drawings of reinforcing steel in accordance with Section 01330.

PART 2 - PRODUCTS

2.01 CEMENT CONCRETE

A. Ready-mixed, conforming to Section 704, Publication 408 Specifications.

1. Requirements for State approved batch plants, design computations and plant inspection shall not apply. The acceptability of concrete will be based on conformance with the Cement Concrete Criteria specified below and the results of the specified tests.

B. Cement Concrete Criteria:

1. Class A
 - a. 28-day compressive strength: 3300 psi.
 - b. Slump: 1 to 3 inches.

2. Class C
 - a. 28-day compressive strength: 2000 psi.
 - b. Slump: 2 to 6 inches.
3. High Early Strength
 - a. 3-day compressive strength: 3000 psi.
 - b. Slump: 1 to 3 inches.
4. Cement Factor and Maximum Water - Cement Ratio conforming to Table A, Section 704.1 (b), Publication Specifications.

2.02 REINFORCEMENT STEEL

- A. Reinforcement Bars:
 1. New billet-steel conforming to Section 709.1, Publication 408 Specifications.
 2. Deformed, Grade 40.
- B. Steel Wire Fabric:
 1. Conforming to Section 709.3, Publication 408 Specifications.

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. Comply with Section 1001, Publication 408 Specifications for construction requirements including formwork, curing, and protection and finishing of cement concrete.
- B. Excavate and shape trench bottoms and sides to accommodate thrust block forms, encasement, manhole bases, inlets and vaults.
- C. Support pipe, valves and fittings at the required elevation with brick or concrete block. Do not use earth, rock, wood, or organic material as supports.
- D. Construct manhole bases, reaction and support blocking, cradles, encasements, and miscellaneous mass concrete of Class C concrete.
- E. Construct cast-in-place vaults, inlets, endwalls, curbs, sidewalks and miscellaneous reinforced structures of Class A concrete.
- F. Construct reinforced and plain cement concrete pavements and base courses of High Early Strength concrete as specified in Sections 02510 and 03300.

- G. Provide spacers, chairs, bolsters, ties and other devices for properly placing, spacing, supporting and fastening reinforcement in place.
- H. Place concrete utilizing all possible care to prevent displacement of pipe or fittings. Return displaced pipe or fittings to line and grade immediately.
- I. Insure tie rods, nuts, bolts and flanges are free and clear of concrete.
- J. Do not backfill structures until concrete has achieved its initial set, forms are removed, and the Contracting Officer inspects concrete work.
- K. Perform backfilling and compaction as specified in Sections 02225 and 02228.

3.02 FIELD TESTS OF CONCRETE DURING CONSTRUCTION

- A. Test each 50 cubic yards or fraction thereof of each class of concrete for compressive strength. Retain an independent testing laboratory to test cylinders.
 - 1. Sample concrete in accordance with ASTM C172.
 - 2. Prepare and cure two test cylinders in accordance with ASTM C31.
 - 3. Test cylinders in accordance with ASTM C39.
- B. If test cylinders fail to meet strength requirements, the Contracting Officer may require additional core tests in accordance with ASTM C42 at the expense of the Contractor.

END OF SECTION

SECTION 03350

CONCRETE FINISHES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. New concrete finishes.
- B. Repair of Contractor cast concrete surface defects.
- C. Repair of Contractor cut concrete surfaces.

1.02 SAMPLES

- A. For each type of wall finish used on this project, the first 50 square feet of finished area shall be inspected by the Contracting Officer for approval purposes.
 - 1. Samples shall be provided until the Contracting Officer's approval is secured.
- B. The approved sample(s) shall serve as the standard for color, texture, and quality for the remainder of the job.
 - 1. The Contracting Officer shall be notified when samples (of each type finish) are completed and shall inspect same.
 - 2. The samples shall be approved by the Contracting Officer in writing prior to starting the remaining areas.

1.03 SUBMITTALS

- A. Submit product data in accordance with Section 01330 for the following:
 - 1. Dry shake hardener.
 - 2. Floor sealant.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be as stated in PART 3 of this Section.

PART 3 - EXECUTION

3.01 CONCRETE FINISHES

- A. Floor Finishes - The finish of all, flow channels, shall be described below and in accordance with the schedule at the end of this Section and as scheduled on architectural drawings.

1. Type C - Troweled Finish
 - a. The surface shall first receive a Type B floated finish.
 - b. It shall next be power troweled, and finally hand troweled for thorough consolidation.
 - c. The first troweling after power troweling shall produce a smooth surface, which is relatively free of defects, but which may still show some trowel marks.
 - d. Additional trowelings shall be done by hand after the surface has hardened sufficiently.
 - e. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface.
 - f. The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to a Class A tolerance, except tolerance for tank age base slabs shall be Class B.
2. Type D - Broom or Belt Finish
 - a. Immediately after the concrete has received a Type B floated finish, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

3.02 REPAIR OF SURFACE DEFECTS

- A. General - Surface defects, including tie holes, shall be repaired immediately after form removal.
- B. Repair of Defective Areas (Contractor Cast Concrete)
 1. All honeycombs, pits, and other defective concrete areas greater than 1 square inch surface area or 1/4-inch maximum depth shall be removed down to sound concrete.
 - a. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut.
 - b. No featheredges will be permitted.
 - c. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar.

- d. A bonding grout shall be prepared using a mix of approximately one part cement to one part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream.
2. The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one part cement to 2-1/2 parts sand by damp loose volume.
 - a. White Portland cement shall be substituted for a part of the gray Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.
 - b. The quantity of mixing water shall be no more than necessary for handling and placing.
 - c. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
 3. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface.
 - a. When the bond coat begins to lose the water sheen, the pre-mixed patching mortar shall be applied.
 - b. The mortar shall be consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface.
 - c. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished.
 - d. The patched area shall be kept damp for seven days.
 - e. Metal tools shall not be used in finishing a patch in a formed wall, which will be exposed.
 - f. Exposed surfaces shall be left uniform in appearance.

3.03 REPAIR OF CONTRACTOR CUT CONCRETE SURFACES

- A. Saw cuts and exposed rebar repair. After saw cutting concrete, repair exposed rebar ends as follows:
 1. Chip back concrete around rebar and with a 20 lb. chipping hammer.
 2. Cut off the exposed rebar minimum 1-1/2 inches past concrete surface.

3. Patch hole with non-shrink grout.

3.04 FINISH SCHEDULES AND TOLERANCES

1. Type C - Troweled Finish - For floors intended as walking surfaces, flow channels, tank age, and all areas where in contact with liquids.
 - a. This finish shall be used in all structures.
2. Type D - Broom or Belt Finish - For sidewalks.

END OF SECTION

SECTION 03370

CONCRETE CURING

PART 1 - GENERAL

1.01 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced.
 - 1. The publications are referred to in the text by the basic designation only.
 - 2. The date of the reference shall be that in effect at the time of bidding.
- B. American Concrete Institute
 - 1. ACI 305R Hot Weather Concreting
 - 2. ACI 306R Cold Weather Concreting
 - 3. ACI 308 Standard Practice for Curing Concrete
- C. American Society for Testing and Materials
 - 1. ASTM C 3 Method of Making and Curing Concrete Test Specimens in the Field
 - 2. ASTM C 309 Liquid Membrane-Forming Compounds for Curing Concrete

1.02 SUBMITTALS

- A. Catalog Cuts - Submit catalog cuts in accordance with Section 01330, for curing compounds and procedures, clearly indicating which item is to be used and where it will be applied.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Liquid curing compound shall be a polymer resin base, which meets the requirements of ASTM C309, Type 1 or Type 2.
 - 1. Type 1 shall be used when concrete is exposed to view and Type 2 shall be used for all concrete, which is not exposed.

PART 3 - EXECUTION

3.01 PREPARATION

- A. All freshly placed concrete shall be protected from adverse weather elements and from defacement.

1. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for providing sufficient water for hydration and preventing loss of moisture from the concrete for at least a 7-day period, the requirements of hot and cold weather concreting being taken into account (reference Section 03300).

3.02 ERECTION-INSTALLATION-APPLICATION

- A. All Slabs, Curbs, Sidewalks, Paving, Slab Toppings, and other Flatwork - After finishing and immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, spray the surface with water to provide continuous moist curing for at least the first 24 hours.
 1. After the initial 24-hour period, cover for an additional six days with waterproof paper or polyethylene blankets.
 2. Wet burlap coverings may be used if the finished surface is not marred or blemished during contact with the coverings.
 - a. Burlap must be kept wet by continuous sprinkling with water.
 - b. Lap the cover material at least 12 inches, covering the top and sides of the concrete.
 - c. The covering shall be weighted down to prevent it from blowing off.
 3. If cover material is not used, the concrete surfaces shall be kept continuously wet by spraying or other approved methods.
 4. Interruptions, not to exceed a total of eight hours are permitted for the purpose of layout or other required construction needs as long as the surface is not allowed to completely dry.
- B. For vertical concrete surfaces while forms are in place, keep continuously damp with a fine water spray for at least the initial 24-hour period.
 1. Within four hours after stripping of forms, or after finishing if no forms are covering the surface, apply a curing compound.
 - a. Coverage shall be complete and at a rate of not more than 300 square feet per gallon.
 - b. If the curing compound is not applied within the specified time, the Contractor shall cure in the manner specified in Paragraph "A" above for a duration of six additional days.
 2. The curing compounds to be used shall not detract from the appearance of the concrete or jeopardize the adherence of finishing material applied later.

C. For additional curing requirements during hot and cold weather, see Section 03300.

3.03 TOPPINGS

A. Grout Topping - Follow curing procedures for slabs as stated above.

END OF SECTION

SECTION 03600

GROUT

PART I GENERAL

1.01 SECTION INCLUDES

- A. Equipment support
- B. Reinforced masonry
- C. Bolts into concrete and masonry
- D. Dowels into concrete
- E. Grouting of precast sections
- F. Grout topping mix
- G. Dry pack grout

1.02 REFERENCES

A The publications listed below form a part of this specification to the extent referenced.

- 1. The publications are referred to in the text by the basic designation only.
- 2. The date of the reference shall be that in effect at the time of bidding.

B. American Concrete Institute

- 1. ACI 304 Recommended Practice for Measuring, mixing, Transporting, and Placing Concrete
- 2. ACI 305R Hot Weather Concreting
- 3. ACI 306R Cold Weather Concreting
- 4. ACI 309 Practice for Consolidation of Concrete
- 5. ACI 530.1 Specifications for Masonry Structures

C. American Society for Testing and Materials

- 1. ASTM C31 Method of Making and Curing Concrete Test Specimens in the Field
- 2. ASTM C33 Concrete Aggregates
- 3. ASTM C39 Test Method for Compressive Strength of Cylindrical concrete specimens
- 4. ASTM C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

5. ASTM C94 Ready-Mixed Concrete
6. ASTM C109 Test method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens)
7. ASTM C143 Test Method for Slump of Portland Cement Concrete
8. ASTM C150 Portland Cement
9. ASTM C476 Specifications for Grout for Masonry
10. ASTM C1019 Standard method of Sampling and Testing Grout

1.03 SUBMITTALS

- A. Submit shop drawings and catalog cuts in accordance with the shop drawing requirements of Section 01330 for the following:
 1. Mix Designs
 - a. The following data must be submitted together with the proposed grout mixes (State DOT-approved materials must submit a copy of DOT test report dated within the last year).
 - 1) Sieve analysis for fine and coarse aggregates (ASTM C136).
 - 2) Soundness tests for fine and coarse aggregates.
 - b. The maximum loss for the ASTM C88 mag. sulfate test shall be not more than 15 percent for sand and 10 percent for coarse aggregates after five cycles.
 - c. The proposed mixes may be field-proven mixes that have been dispensed by the batch plant within the last year and conform to the requirements of this Section and can be documented by at least ten consecutive test reports.
 - d. A certificate must accompany the test reports, stating that all ingredients for the proposed mixes will be identical and from the same source as the ingredients used in the documented mixes.
 - e. In the absence of field-proven mixes, trial mixes must be submitted, designed by an independent laboratory and documented by 7-day, 21-day and 28-day average tests, according to ACI 301, paragraph 3.9.3.3.
 - 1) The average strengths must be higher than the design strengths stated in ACI 301, paragraph 3.9.2.

- f. The submittals for proposed mixes (according to 2 or 3) must list the amount and source of each ingredient, together with the actual slump (not design slump).
2. Submit catalog cuts for all admixture products with supporting data, clearly indicating which item is to be used.
 - a. Admixtures shall be included in-any proposed mix designs.
3. Submit catalog cuts showing grout product to be used for anchoring bolts and dowels into concrete and masonry.

PART 2 - PRODUCTS

2.01 GROUT

- A. Standard Grout - For general use such as is required for sloping of base slabs, grouting between precast roof planks, and for fillets and/or benches in precast vaults/manholes; shall consist of sand, water, and a minimum of 11 sacks of cement per cubic yard with a water cement ratio not greater than 0.46.
 1. Grout shall have a 4000-psi normal 28-day compressive strength.
 2. Maximum slump shall be 3 inches.
- B. Non-Shrink Grout - shall be a fluid or flowable non-gas liberating cement base product that is manufactured premixed, requiring only the addition of water at the job site.
 1. All components shall be inorganic.
 2. Non-shrink grout shall have a minimum strength of 4500 psi in seven (7) days for precision support bases of smaller equipment of 10 HP or less and precast sills.
 3. For precision support of equipment bases and sole plates for large loads and when stresses from vibrations are involved or when equipment will be subject to thermal movement, use non gas-forming grout specifically manufactured for such applications.
 4. Provide Contracting Officer with manufacturer's certification for the use intended, including 21 x 21 grout cube strength tests in accordance with ASTM C109.
 - a. Grout tests shall achieve 5000 psi in 7 days and 7000 psi in 28 days.
- C. Grout for Reinforced Masonry - shall comply with ASTM C476 and ACI 530.1.

1. The grout shall be batched, mixed and delivered in accordance with the requirements of transit-mixed concrete (ASTM C94) or mechanically mixed on the job site.
2. The maximum time elapsed after adding the mixing water before fully discharging grout shall be 90 minutes.
3. Fine grout shall be used for all grouting spacing less than 2-1/2 inches wide; coarse grout shall be used for all other applications (bond beams, filling of vertical cells, etc.)

	Portland Cement	Hydrated Lime	Aggregate Fine	Coarse
Fine Grout	1	0 to 1/10	2-1/4 to 3	--
Coarse Grout	1	0 to 1/10	2-1/4 to 3	1 to 2

NOTE: For grout spaces larger than 6 inches, regular concrete may be used. Coarse aggregate for grout shall be size number 67 conforming to ASTM C33.

4. Grout shall attain 1500-psi compressive strength at 7 days and 2500 psi at 28 days.
 5. Grout shall be placed with an 8- to 10-inch slump.
 6. Joint mortar shall not be used for grouting.
- D. Grout For Bolts and Dowels - Grout used to install bolts into concrete and masonry, and grout used to install reinforcing dowels into concrete shall be a pre-measured, two-part, self-mixing, cartridge type, epoxy adhesive.
1. All structural and miscellaneous bolted connections to concrete and masonry shall be two bolts minimum.
 - a. Bolts installed into concrete and masonry shall not be closer than 6 inches o.c.
- E. Dry Pack Grout - shall be one part Type I Portland cement, two parts fine aggregate as specified herein with sufficient water to form a damp formable, but self-supporting consistency.

PART 3 - EXECUTION

3.01 CLEANING

- A. Prior to grout placement, the existing concrete surface shall be cleaned of all mud, grease, oil, ice, snow, or any other coating that would destroy or reduce the bond to the concrete.
- B. Where grout is installed over a concrete surface that was not finished with a Type A scratched finish, an appropriate epoxy-bonding compound shall first be used and surface preparations, mixing and application of the bonding compound shall be in conformance with manufacturer's recommendations.

3.02 GROUT MIXING

- A. When a scheduled grout placement will consist of 3 cubic yards or more, the grout shall be produced at a batch plant, not site mixed.

3.03 TESTING FOR QUALITY ASSURANCE

- A. A quality assurance and verification-testing program will be conducted by the owner generally consisting of measuring slump and tests for the Compressive Strength.
 - 1. These test results will be made available to the Contractor to assist his control of quality in order to meet specified values.
- B. The Contractor shall coordinate with the Contracting Officer and testing laboratory to assure that testing can be accomplished as specified or as required to conform to the Contract Documents.
 - 1. The Contractor shall provide 48 hours notice to the Contracting Officer of the need of services of the testing laboratory.
 - 2. The Contractor shall provide free access to work and cooperate with the testing laboratory.
- C. The following tests will be performed by the owner's testing laboratory:
 - 1. Slump Test Slump tests shall be made in the field by the testing laboratory on each batch of grout produced, in accordance with ASTM Specification C143.
 - a. Grout, which exceeds the slump, specified shall not be used.
 - 2. Compressive Strength Test (for Masonry Grout)
 - a. Samples of freshly mixed grout will be taken and tested by the testing laboratory for compressive strength in accordance with ASTM C1019 except as modified herein.

- b. In general, one sampling will be taken for each 1000 sq.ft. of wall constructed or at a change in the mix properties, methods of mixing, or materials used.
- c. Each sampling shall consist of three grout prism specimens to be formed with concrete masonry units supplied by the Contractor from the job site stock.
 - 1) Each specimen will be identified by a tag, furnished by the Contracting Officer, which will be attached to the side of the specimen.
 - 2) The Contracting Officer will verify all information on the tag, and the Contractor shall also satisfy himself that such information is correct.
- d. It is the Contractor's responsibility that prism specimens are stored in an approved storage box provided by the Contractor on the construction site for 48 hours after they have been molded at a temperature between 60 degrees F and 80 degrees F.
- e. After 48 hours, the samples will be transported to the testing laboratory and moist cured until testing in accordance with ASTM C39.
 - 1) One specimen will be tested at 7 days, and two at 28 days.
- f. Should a 7-day or 28-day test strength from any sampling is lower than the specified compressive strengths, the Contractor shall immediately correct the mix for the next grout placement operation.

END OF SECTION

SECTION 11305

RESIDENTIAL GRINDER PUMP STATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide ready to operate, grinder pump stations complete with a semi-positive displacement grinder pump, fiberglass tank, pump removal system, valves, control panel, wiring, complete with all necessary accessories, in compliance with the following Specifications.
- B. Grinder Pump Station shall be located as directed by the Contracting Officer.

1.02 REFERENCES

1.03 PERFORMANCE REQUIREMENTS

- A. The pumps shall be grinder pumps designed to pump untreated municipal wastewater with high concentrations of solids, grit, and organic material without plugging.
- B. Pumps shall be capable of the following performance requirements:
 - 1. Primary operating Condition
 - a. Pump Capacity (gpm) 11
 - b. Total Dynamic Head (psig) 40
 - 2. Secondary Operating Condition
 - a. Pump Capacity (gpm) 15
 - b. Total Dynamic Head (psig) 0
 - 3. General
 - a. Motor Horsepower (HP) 1
 - b. Maximum Pump Speed (rpm) 1725
- C. Pumps shall be capable of operating at negative heads without overloading the motors.
- D. All grinder pump stations shall be designed against flotation as per the manufacturer's recommendation. For design, groundwater shall be assumed at the top of the station and the design shall provide for a 15 percent factor of safety against flotation. The calculations shall be prepared in a neat and legible manner and submitted to the Contracting Officer for review.

1.04 SUBMITTALS

- A. Shop drawings in accordance with Section 01330.
- B. Manufacturer's certificates, including performance affidavit, for all equipment furnished under this section.
- C. Manufacturer's instructions in accordance with Section 01330.

1.05 SPARE PARTS

- A. The following spare parts shall be provided in clearly identified containers for each pump:
 - 1. one (1) tygon tube
 - 2. pressure switch (on/off)
 - 3. pressure switch (alarm)
 - 4. heating resistor
 - 5. gasket
 - 6. stator
 - 7. liner
 - 8. shedder
 - 9. groove pin
 - 10. set end bearings
- B. Three spare pumps shall be provided.

1.06 EXPERIENCE AND QUALIFICATION REQUIREMENTS

- A. Due to the special importance of proper functioning of the equipment specified in this section to the satisfactory operation of the entire treatment system, the Contractor shall demonstrate in writing, to the satisfaction of the owner at the time of the shop drawing submittal that the manufacturer has produced the specified type and size of equipment for sanitary wastewater service that has been in successful operation for a minimum period of five years prior to the bid date.
- B. In the event the Contractor elects to install equipment whose manufacturer cannot comply with the above experience requirement, then the Contractor shall submit with shop drawings, appropriate bonds or deposits guaranteeing replacement of the equipment in event of failure for a period of three years after warranty.
 - 1. Such three-year period shall start upon the termination of the Contractor's basic warranty and guarantee obligations under the Contract.
- C. During such three-year period the Contractor shall repair, modify, or replace the equipment in a manner acceptable to the owner, if in the opinion of the owner, the operation of the equipment is unsatisfactory.

1. Normal wear or malfunctions due to neglect or abuse will not be considered justifiable reasons for unsatisfactory operation.
2. In the event the owner determines the operation of the equipment to be unsatisfactory during this three year period and the Contractor fails to correct the deficiencies within six months from the time the Contractor is first notified in writing that such deficiencies exist, the owner will make the necessary repair or replacement and deduct such costs from the aforementioned bonds or deposits of the Contractor.

PART 2 - PRODUCTS

2.01 EQUIPMENT DESIGN

A. Pumps

1. The grinder pump shall be mounted in the fiberglass tank.
2. Pumps shall be progressive cavity type with vertical rotor and mechanical seal.
3. Rotor shall be hardened, polished, stainless steel.
4. Stator shall be of a compounded ethylene propylene synthetic elastomer.
5. All pump materials exposed to liquid shall exhibit high abrasion, grease, and temperature resistance.

B. Grinder

1. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft.
2. The grinder impeller assembly shall be securely fastened to the pump motor shaft.
3. The grinder will be of the rotating type with a stationary hardened and ground chrome steel shredding ring spaced in accurate close annular alignment of the driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars.
 - a. This assembly shall be balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures.
4. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting.
 - a. Sufficient vortex action shall be created to scour tank free of deposits or sludge banks, which would impair the operation of the pump.
 - b. These requirements shall be accomplished by the following, in conjunction with the pump:
 - 1) The grinder shall be positioned in such a way that solids are fed in an upward flow direction.

- 2) The inlet shroud shall have a diameter no less than 5 inches.
 - 3) At maximum flow the average inlet velocity must not exceed 0.2 feet per second.
 - 4) The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.
5. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of “foreign objects” such as paper, wood, plastic, glass, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4”, diameter discharge piping.

C. MECHANICAL SEAL

1. The core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump.
2. The seal shall have a stationary ceramic seat and carbon-rotating surface with faces precision lapped and held in position by a stainless steel spring.

D. TANK

1. The tank shall be fiberglass reinforced polyester resin and shall be furnished with one PVC bolt on closet inlet flange to accept a 4.50 OD. DWV pipe.
2. Tank operating capacity shall be minimum 120 gallons.
3. Depth of tank from top of access hatch to base of unit shall not exceed 120 inches.
4. Tank shall have a single chamber for liquid storage in which both grinder pumps shall be located.
5. The access way shall be an integral extension of the FRP tank and shall be fiberglass reinforced polyester resin.
 - a. It shall have an access opening at the top to accept a lockable fiberglass cover with skirt.
 - b. The cover will be attached with stainless steel fasteners.
 - c. The access way shall include the following factory installed items:
 - 1) Copper 1-1/4” grinder discharge extension with a surface operable positive sealing quick disconnect coupling.
 - 2) Full ported shut-off valve,

- 3) Anti-siphon valve,
- 4) Check valve terminating in a watertight bulkhead fitting with external 1-1/4" male pipe thread,
- 5) 2" PVC internal vent for venting the tank.
- 6) Internal wiring shall terminate in a sealed junction box that is integral with the access way and suitable for outdoor use.
- 7) All seals shall be factory tested to ensure their watertight integrity.

E. CORE UNIT

1. The Grinder Pump shall have a cartridge type easily removable core assembly containing pump, motor, grinder, controls, check valve, anti-siphon valve and wiring.
2. The watertight integrity of the core unit, including wiring and access cover, shall be established by 100% factory test at a minimum of 5 psig.

F. CHECK VALVE

1. The pump discharge shall be equipped with factory installed, gravity operated, flapper-type integral check valve built into the discharge pipe.
 - a. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow.
2. Working parts will be made of a 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength.
3. A non-metallic hinge shall be an integral part of the flapper assembly providing maximum degrees of freedom for assured seating even at a very low backpressure.
4. The valve body shall be a high gloss injection molded part made of PVC type I-II.

G. CHECK VALVE AT CONNECTION TO THE FORCE MAIN

1. Where the discharge piping connects directly into a force main, a check valve shall be installed to prevent flow through broken discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow.

H. ANTI-SIPHON VALVE

1. The pump shall be constructed in a positively primed flooded suction configuration.

- a. As added assurance that the pump cannot lose prime, even under negative pressure conditions in the discharge piping system, the pump shall be equipped with a factory installed, integral anti-siphoning air relief valve in the discharge piping immediately below the check valve in the basin.
- b. This valve will automatically open when the pump is off.

2.02 ACCESSORIES

A. Pump Removal Device

1. The grinder pump core unit shall have two lifting eyes complete with nylon lift-out harness connected to its top housing to facilitate easy core removal when necessary.
2. All mechanical and electrical connections must provide easy disconnect accessibility for core unit removal and installation.
3. All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station.

2.03 MOTORS AND DRIVES

1. Pump motor shall operate on 1 phase, 240 volt, and 60-hertz power supply.
2. Pump motor shall be squirrel cage induction type. Suitable for submersible applications with a 1.15 service factor.
3. Motor shall have thermal overload protection.

2.04 CONTROLS

1. Controls shall be integral with the grinder pump and shall be located in the top housing of the core unit inside a waterproof access cover.
2. Non-fouling wastewater level detection for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air-bell level sensor connected through airtight tubing to a pressure switch.
 - a. The level detection device shall have no moving parts in direct contact with the wastewater.
 - b. High-level sensing will be accomplished in the manner detailed above by a separate air-bell sensor and pressure switch of the same type.
3. Each level control shall have its own built-in fail-safe design, which will prevent the entrance of moisture into the controls in case of switch diaphragm failure.

- a. To assure reliable operation of the pressure sensitive switches, each core shall be equipped with a quick disconnect breather assembly, complete with a check valve to prevent accidental entry of water into the motor compartment in the event of access way flooding.
4. The grinder pump will be furnished with two ten foot (10') lengths of type UF cable, pre-wired and connected with weatherproof materials.
 - a. The power supply cable shall be 12-2 w/ground, designed for single phase, 240 volt, 60-Hertz power supply, and meet UL requirements.
 - b. The signal cable to a high-level indicator alarm device shall be 14-2 w/ground, designed for a single phase, 120 Volt, 60-Hertz power supply and meet UL requirements.
 5. A high-level indicator lamp assembly requiring 120 volts and suitable for remote installation in a standard device box shall be furnished.
 - a. This indicator lamp shall be mounted on a wall plate and marked 'GRINDER PUMP MONITOR'.
 6. ALARM / DISCONNECT PANEL
 - a. Each grinder pump station shall include a 3R, UL listed ALARM DISCONNECT PANEL suitable for wall mounting.
 - b. The panel shall be pole mounted or as advised by the Owner..
 - c. The NEMA 3R enclosure shall be manufactured of thermoplastic or fiberglass to assure corrosion resistance.
 - d. The enclosure shall come complete with an access panel with a hinged, pad lockable cover, which provides a secured dead front and component knockouts.
 - e. The enclosure shall not exceed 12 W x 12, H x 6 ND.
 - f. For each pump core the panel shall contain one (1) 15 amp, double pole circuit breaker for the power circuit and one (1) - 15 amp single pole circuit breaker for the alarm circuit.
 - g. The panel shall contain terminal blocks, integral power bus, and a complete alarm circuit.
 - h. The alarm circuit shall consist of device with alarm sequence as follows:
 - 1) When Liquid level in sewage wet-well rises above alarm level, visual and audio alarms will be activated.
 - 2) Audio alarm may be silenced by means of the externally mounted, NEMA 4X rated, push-to silence button.

3) Visual alarm remains illuminated until sewage in wet-well returns to normal operating level.

i. For two pump units, in addition to the above, provide appropriate contacts for a single remote indication high-level alarm if either pump is in a high-level alarm condition. Alarm light (not by manufacturer) shall be mounted on top of the control panel.

1) During a high-level alarm condition the appropriate light will illuminate to indicate which pump core requires servicing.

2.05 SOURCE QUALITY CONTROL (TESTS, INSPECTIONS, ETC.)

A. The equipment shall be shop assembled and tested to ensure compliance with these specifications.

2.06 FABRICATION REQUIREMENTS

A. Surface preparation, shop painting, field painting and other pertinent detailed painting specifications shall be in accordance with the manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

A. Contractor shall furnish all necessary oil and grease for initial operation.

3.02 EQUIPMENT INSTALLATION

A. Contractor shall furnish and install the pumping equipment according to manufacturer's instructions.

B. Mounting details shall be in full compliance with manufacturer's recommendations.

C. Grinder pump controls and electrical equipment shall be installed in accordance with installation details as shown on the plans.

D. Coordinate installation of grinder pump and electrical controls with the property owner.

3.03 FIELD TESTING AND INITIAL OPERATION

A. Demonstrate proper operation of each grinder pump unit including automatic start-stop and alarm functions. Using clean water operate each pump through one complete cycle. Manufacturers' representative shall be present during the start-up activities.

B. Final acceptance of the pumps will not be made until after each pump has met the stated performance requirements including meeting the hydraulic head and flow capacity, and verification that the motors are not overloaded during the specified operating conditions.

3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide manufacturer's (or supplier's) services during start-up and test of grinder pump units.

END OF SECTION