US Army Corps
of Engineers
Baltimore District

CONSTRUCTION SPECIFICATIONS

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM

OLYPHANT, PENNSYLVANIA

INVITATION FOR BIDS **W912DR-04-B-0015**

CONTRACT NO.

DATE **JUN 04, 2004**

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SECTION 01000

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SUBMITTALS

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

SD-01 Data

Cost or Pricing Data; FIO.

Proof of actual equipment costs.

Equipment Data; FIO.

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

SD-06 Instructions

O and M Data; FIO.

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

SD-07 Schedules

Progress Schedule; GA|AR.

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

SD-18 Records

Title Evidence; FIO.

Proof of purchase for equipment and/or materials.

Invoice Copies; FIO.

Proof of rental equipment costs.

Payment Evidence; FIO.

Proof of full payment.

Photographs; FIO.

Progress photographs and negatives.

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 PAYMENTS TO CONTRACTORS: (NOV 1976)

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

1.4 IDENTIFICATION OF EMPLOYEES: (OCT 1983)

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

1.5 PURCHASE ORDER: (SEP 1975)

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

indicate the purchase price. (CENAB-CO-E)

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

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

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

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

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

1.7 REAL PROPERTY EQUIPMENT DATA: (APR 1975)

At or before the time of completion of the contract, the Contractor shall submit to the Contracting Officer a complete itemized list, including serial and model number where applicable, showing the unit retail value of each Contractor furnished item of mechanical, electrical and plumbing equipment installed by the Contractor under this contract. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier, against defective materials, design, and workmanship, the following information shall be given: the name, address and telephone number of the Subcontractor, Equipment Supplier, or

Manufacturer originating the guaranteed item. The list shall be accompanied by a copy of the specific guarantee document for each item which is specified herein to be guaranteed if one had been furnished to the Contractor by the Equipment Supplier or Manufacturer. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Baltimore District NADB Form 1019 may be utilized for the itemized listing and will be made available to the Contractor upon request. (CENAB-CO-E)

1.8 O and M DATA: (JUL 1979)

The requirements for furnishing 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)

1.9 NEGOTIATED MODIFICATIONS: (OCT 84)

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

1.10 PHOTOGRAPHS

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

1.11 PERMITS

The Contractor shall abide by all permit restrictions and/or conditions. Copies of these permits, plans, and amendments will be kept on site and be available for review upon request.

1.11.1 Environmental Permits

Permits and related documents are as specified below.

a. Erosion and Sediment (E&S) Pollution Control Plans have been submitted and approved. The Contractor shall accept a transfer of the permit to his company. See attached documentation.

b. Commonwealth of Pennsylvania 401 Certification has been received from the state government. See attached documentation.

c. National Pollutant Discharge Elimination (NPDES) Permit request has been submitted and approved. The Contractor shall accept a transfer of the permit to his company. See attached documentation.

1.11.2 State Permits

Pennsylvania Department of Transportation (PADOT) Highway Occupancy (HOP) Permit: Permit request has been submitted by the Borough engineer for approval.

1.12 PARTNERING: (NOV 92)

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

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

NOT APPLICABLE

-- End of Section --

PHYSICAL CONSTRUCTION PROGRESS CHART

CONTRACTOR	PROJECT	CONTRACT DESCRIPTION	SUBMITTED FOR APPROVAL	DATE	DATE NOTICE TO PROCEED RECEIVED	MILESTONE DATES
CONTRACT NUMBER	LOCATION		APPROVAL RECOMMENDED	DATE	STARTING DATE	
			APPROVED	DATE	COMPLETION DATE	

PRINCIPAL CONSTRUCTION FEATURE	EST. COST	DURATION CAL. DAYS

NADB Form 1153
27 Mar. 73

Pennsylvania Department of Environmental Protection

2 Public Square
Wilkes-Barre, PA 18711-0790
March 24, 1997

Northeast Regional Office 717-826-2553

Department of Army
Baltimore District
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Attention: Dr. James F. Johnson
Chief, Planning Division

RE: Water Quality Certification
Olyphant Local Flood Protection Project
Lackawanna County

Dear Dr. Johnson:

This will acknowledge receipt of your request for certification for the above referenced project under Section 401 of the Federal Clean Water Act. You are hereby notified that Water Quality Certification is granted for this project.

Enclosed are copies of correspondence which I received in response to the public notice issued for this project. Please pay particular attention to the requirements specified in these documents.

If you should have any questions regarding this letter, please do not hesitate to contact me at the above telephone number.

Sincerely,

Kate Crowley

Kate Crowley
Program Manager
Water Management Program

Enclosures (3)

Federal Emergency Management Agency

Region III
Liberty Square Building (Second Floor)
105 South Seventh Street
Philadelphia, PA 19106

March 19, 1997

RE: Olyphant Borough,
Lackawanna County,
Pennsylvania

Ms. Kate Crowley KLC 3/21
Water Management Program Manager
Commonwealth of Pennsylvania
Department of Environmental Protection
2 Public Square
Wilkes-Barre, Pennsylvania 18711-0790

Dear Ms. Crowley:

This is in response to the Public Notice regarding the Olyphant, Pennsylvania Local Flood Protection Project. In accordance with Executive Order (E.O.) 11988, Federal Agencies are required to avoid direct or indirect support of floodplain development whenever there is a practical alternative. If an action must be located in the floodplain, then the agency must avoid the long- and short-term adverse impacts associated with the occupancy and modifications of the floodplain and must minimize the potential harm to people and property and to natural and beneficial floodplain values.

I have enclosed a copy of two handouts entitled "Floodplain Management Guidelines for Implementing E.O. 11988," and "Revisions to National Flood Insurance Program Maps," respectively. Within the "Floodplain Management Guidelines for Implementing E.O. 11988" booklet, Part II - Decision Making Process outlines an eight step process designed to reflect the decision making process required under Section 2(a)(1) of the Order. Section 2 states, "In carrying out the activities described in Section 1 of this Order each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management; and to prescribe procedures to implement the policies and requirements of this Order."

As explained in the "Revisions to National Flood Insurance Program Maps" handout, we will issue a Conditional Letter of Map Revision for proposed projects in the 100-year floodplain provided all the necessary plans and hydraulic data are submitted. We will then follow up with a physical map revision when as-built plans are submitted, if necessary. The only way we can keep each community's floodplain maps up-to-date is by obtaining your cooperation in this effort.

In summary, the Federal Agency funding or constructing a project is responsible to ensure compliance with E.O. 11988. If the floodplain cannot be avoided, then the minimum requirements of the National Flood Insurance Program must be met.

Our role is to offer guidance or assistance in any way that we can. If you have any questions concerning this letter, E.O. 11988, or any other floodplain management issue, please feel free to contact me at (215) 931-5665.

Sincerely,

Erik J. Rourke

Erik J. Rourke
Hazard Identification and Risk Assessment

Enclosures:
1. Floodplain Management Guidelines for Implementing E.O. 11988
2. Revisions to National Flood Insurance Program Maps

cc: District Engineer (CENAB-PL-P)
US Army Corps of Engineers, Baltimore District

COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

ADMINISTRATIVE BUREAUS:

ADMINISTRATION	717-787-5671
AUTOMOTIVE AND PROCUREMENT DIVISION	717-787-8594
LICENSE DIVISION	717-787-2084
PERSONNEL DIVISION	717-787-7836
WILDLIFE MANAGEMENT	717-787-5529
INFORMATION & EDUCATION	717-787-6286
LAW ENFORCEMENT	717-787-5740
LAND MANAGEMENT	717-787-6818
REAL ESTATE DIVISION	717-787-6568
MANAGEMENT INFORMATION SYSTEMS	717-787-4076

March 5, 1997

Ms. Kate Crowley KLC 3/10
Pennsylvania Department of Environmental Protection
2 Public Square
Wilkes-Barre, PA 18711-0790

[illegible] WAYS
COUNTY:
MAR 10 [illegible]
MUNIC:
PERMIT #:
FILE CODE:

In re: Olyphant Flood Protection Project
Borough of Olyphant
Lackawanna County, PA

Dear Ms. Crowley:

This is in response to the Public Notice dated February 3, 1997, requesting information concerning endangered and threatened species of birds and mammals as related to this project.

Our office review shows that no state listed endangered or threatened species of birds or mammals are known to occur within the proposed project area. Also, the proposed project should not impact any State Game Lands (SGL) However, should project plans extend beyond the present study area, or if additional information on endangered or threatened species of birds or mammals or SGL becomes available, this review may be reconsidered.

This reply relates only to endangered and threatened species of birds or mammals and does not address other concerns of the Pennsylvania Game Commission. If an on-site field investigation determines the project may impact critical and unique wildlife habitat such as wetlands, you may be requested to conduct additional surveys.

If you have any questions, please contact Tony Ross of my staff at (717) 783-5957.

Very truly yours,

Tony Ross for

Denver A. McDowell, Chief
Division of Environmental
Planning and Habitat Protection
Bureau of Land Management

TR/pfb

Lackawanna County Conservation District
395 Bedford Street - Bedford Station - Clarks Summit, PA 18411 - Ph. (717) 587-2607

SOIL & WATERWAYS
COUNTY:
MAR - 5
MUNIC:
PERMIT #:
FILE CODE:

March 4, 1997

Ms. Kate Crowley KLC3/6
Water Management Program Manager
Department of Environmental Protection
2 Public Square
Wilkes-Barre PA 18711-0790

RE: Public Comment
Olyphant Flood Protection Project

Dear Ms. Crowley:

In reference to the proposed project, insure that an erosion and sediment pollution control plan is developed and best management practices implemented according to Pennsylvania Department of Environmental Protection Regulations. A plan is required for all earthmoving activities. In addition, an NPDES permit is required for all activities involving earthmoving on five or more acres of land. Areas outside of the project limits such as borrow areas and/or fill and wastes areas must also have erosion and sediment controls practices developed and implemented.

Should you have any questions concerning our comments, please feel free to contact our office.

Sincerely,

Ernest Keller
District Manager

Pennsylvania Department of Environmental Protection

2 Public Square
Wilkes-Barre, PA 18711-0790
November 20, 2001

Northeast Regional Office

570-826-2511
Fax 570-830-3016

Mr. Raymond F. Smith, Jr., P.E.
Design Team Leader
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

Re: NPDES Permit No. PAS10N031
Olyphant Local Flood Protection Project
Dickson City and Olyphant Boroughs, Lackawanna County

Dear Mr. Smith:

Enclosed is the above-referenced permit which authorizes the discharge of storm water from the construction activity described in the final erosion and sedimentation control plan and the permit application. A copy of the final erosion and sedimentation control plan is also enclosed. Please ensure that the erosion and sedimentation control plan is fully implemented and available at the construction site.

The erosion and sedimentation control plan was reviewed to determine whether it is adequate to satisfy the requirements of the Chapter 102, Erosion Control Rules and Regulations. Neither the Department nor the Conservation District assume responsibility for the implementation of the plan or the proper construction and operation of the facilities contained in the plan.

Please read carefully Parts A, B and C of the permit which detail the terms and conditions of this authorization. Conservation District staff and/or representatives of the Department of Environmental Protection may inspect this earthmoving activity to determine compliance with applicable permit requirements, Chapter 92, 101 and 102 Rules and Regulations and the Clean Streams Law.

Permit requirements and federal regulations at 40 C.F.R. §122.21(b) require "when a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit". Please be advised that once a contractor has been selected for the project, the contractor must either be added as a co-permittee or the permit responsibility must be transferred to the contractor. The enclosed form must be used to designate a co-permittee/transferee.

Enclosed is a Notice of Termination (NOT) form to be completed and filed with the District once construction activities have ceased and final stabilization has been achieved.

The Conservation District must be notified by telephone or by mail at least seven days prior to the start of construction.

This authorization does not relieve the applicant from applying for and obtaining any and all additional permits or approvals from local, state or federal agencies for the construction activity described in the permit application.

If you have any questions regarding this permit, please contact Jerry Stiles at 570-218-9495.

Sincerely,

Kate Crowley

Kate Crowley
Program Manager
Water Management Program

Enclosure

cc: Lackawanna County Conservation District
U.S. Army Corps of Engineers, Baltimore District
Dickson City Borough/Nicole Fekete, Secretary
Olyphant Borough/William Shigo, Secretary

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PROTECTION

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT (FOR DISCHARGE OF STORM WATER FROM CONSTRUCTION ACTIVITIES) NO. PAS10N031

In compliance with the provisions of the Clean Water Act, 33 U.S.C. Section 1251 et seq. (the "Act"), and Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 et seq.,

U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

is authorized to discharge storm water from construction activities from a facility/site located at **the Olyphant Local Flood Protection Project along the east and west banks of the Lackawanna River, commencing at the intersection of Church and River Streets and terminating at the intersection of Lafayette and Ash Streets in Dickson City and Olyphant Boroughs in Lackawanna County** to receiving waters named **Lackawanna River,** in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts A, B, and C hereof.

This permit and the authorization to discharge shall commence on NOV 27 2001 and expire at midnight, NOV 26 2006.

The authority granted by this permit is subject to the following further qualifications:

1. If there is a conflict between the application, its supporting documents and/or amendments and the terms and conditions of this permit, the terms and conditions shall apply.

2. Failure to comply with the terms or conditions of this permit is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

3. Application for renewal of this permit, or notification of intent to cease discharging by the expiration date, must be submitted to the Department at least 180 days prior to the above expiration date (unless permission has been granted by the Department for submission at a later date), using the appropriate NPDES permit application or Notice of Termination (NOT) form. In the event that a timely and complete application for renewal has been submitted and the Department is unable, through no fault of the permittee, to reissue the permit before the above expiration date, the terms and conditions of this permit will be automatically continued and will remain fully effective and enforceable pending permit reissuance or denial of the application for permit renewal.

4. This permit will be terminated if construction activities have been completed prior to the expiration date of this permit. For purposes of this permit, construction activities are completed when permanent stabilization of the site is attained, as defined in Part B.3 of this permit and Chapter 102 of the Department's Rules and Regulations.

5. No condition of this permit shall release the permittee from any responsibility or requirement under Pennsylvania, or federal environmental statutes or regulations, or local ordinances.

PERMIT ISSUED:

BY: Kate Crowley
Kate Crowley

TITLE: Program Manager, Water Management Program

DATE: NOV 27 2001

PART A

EFFLUENT LIMITATIONS, SELF-MONITORING AND REPORTING REQUIREMENTS

1. EFFLUENT LIMITATIONS

Effluent limitations are provided in the permit as Erosion and Sediment Control (E&S) plans and Preparedness Prevention and Contingency (PPC) plans, and other Best Management Practices (BMPs) which restrict the quantity and rate of sediment discharge into surface waters of the Commonwealth. Any specific numeric effluent limits necessary to assure that instream water quality criteria are attained and instream uses are protected are set forth in Appendix A, if applicable.

2. MONITORING REQUIREMENTS

In the event the permittee monitors storm water discharge outfalls regulated under this permit, all monitoring data shall be reported in accordance with Part A.3 of this permit.

The Department, and the local County Conservation District when acting as the processing entity, reserve the right to enter onto the site to conduct monitoring or require monitoring where necessary in appropriate circumstances such as where a danger of water pollution is present, or water pollution is suspected to be occurring from a construction activity subject to this permit. The permittee shall commence such monitoring upon notification from the Department, or the local County Conservation District when acting as the processing entity.

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

3. REPORTING AND RECORD KEEPING

a. Reporting of Monitoring Results.

In the event monitoring of outfalls is conducted, monitoring results shall be summarized on a Discharge Monitoring Report Form (DMR) and submitted to the Department on an annual basis, postmarked no later than January 31st of each year. If the construction activity is terminated (see condition 4 in the permit cover sheet) prior to the 31st of that year, the DMR should be submitted upon the termination. (DMR forms can be obtained from the appropriate regional office of the Department.) A signed copy of the DMR Form and all other reports required herein, shall be submitted to the Department's regional office at the following address:

Department of Environmental Protection
Water Management Program
Soils and Waterways Section
2 Public Square
Wilkes-Barre, PA 18711-0790

b. Non-Compliance Reporting.

(1) Required reporting. The permittee shall report non-compliance to the Department and the local County Conservation District, when acting as the processing entity, in accordance with the following:

(a) 24-Hour Oral Reporting - the permittee shall give at least a 24-hour advanced notice to the Department and the local County Conservation District, when acting as the processing entity, of any planned changes to the permitted activity or facility that may result in non-compliance with permit requirements. The permittee shall also report non-compliance with any term or condition of this permit to the Department and the local County Conservation District, when acting as the processing entity, within 24 hours of becoming aware of the non-compliance.

(b) Follow-up Written Reporting - where the permittee orally reports the information in Part A.3.b within the previously mentioned 24-hour time period, a written submission outlining the reported information must be submitted to the Department and the local County Conservation District, if acting as the processing entity, upon request.

(c) Other Reporting - the permittee shall report all instances of non-compliance, which are not reported pursuant to (a) and (b) above, at least annually.

(d) Non-compliance reporting pursuant to A.3.b.(1)(a)-(c) shall not excuse a person from immediate notification to the Department of incidents causing or threatening pollution pursuant to 25 Pa. Code §101.2(a).

(2) Required Information. The reports and notifications required in Part A.3.b.(1) above shall contain the following information:

(a) A description of the discharge and cause of non-compliance;

(b) The period of non-compliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and

(c) Steps being taken to reduce, eliminate and prevent recurrence of the non-complying discharge.

c. Test Procedures.

Unless otherwise specified in this permit, the test procedures for the analysis of pollutants shall be those contained in 40 C.F.R. Part 136, alternate test procedures approved pursuant to that part, or other alternate procedures approved by the Department .

d. Recording of Results.

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

(1) The exact place, date, and time of sampling or measurements;

(2) The person(s) who performed the sampling or measurements;

(3) The dates the analyses were performed;

(4) The person(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

e. Retention of Records.

The permittee shall retain records of all monitoring activities and results (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of three years from the date of the sample, measurement, report or application. This period may be extended by request of the Department and the local County Conservation District, if acting as the processing entity, at any time.

f. Availability of Reports.

Except for data determined to be confidential under §607 of the Clean Streams Law, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. As required by the Clean Water Act, the Clean Streams Law, and 25 Pa. Code §92.63, permit applications, permits, and effluent data shall not be considered confidential.

4. DISCHARGES CONSISTENT WITH TERMS AND CONDITIONS OF THE PERMIT

All discharges authorized by this NPDES permit shall be consistent with the terms and conditions of the permit.

5. NEW TOXIC EFFLUENT STANDARDS OR PROHIBITIONS

If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under §307(a) of the Federal CWA for a toxic pollutant which is present in the permittee's discharge, and such standard or prohibition is more stringent than any limitation upon such pollutant in the NPDES permit, the Department shall revise or modify the permit in accordance with the toxic effluent standard or prohibition and so notify the permittee. In the absence of a Departmental action to modify or to revoke and reissue this permit, any toxic effluent standard or prohibition established under Section 307(a) of the Act is considered to be effective and enforceable against the permittee.

PART B

STANDARD CONDITIONS

1. MANAGEMENT REQUIREMENTS

a. Permit Modification, Termination, or Revocation and Reissuance.

(1) This permit may be modified, suspended, revoked and reissued, or terminated during its term for any of the causes specified in 25 Pa. Code Chapter 92 including, but not limited to, the following:

(a) Violation of any terms or conditions of the permit;

(b) Obtaining a permit by misrepresentation or failure to discuss fully all relevant facts; and

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(2) The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated non-compliance, does not stay any permit condition.

(3) Permit modification or revocation will be conducted in accordance with 25 Pa. Code Chapter 92.

b. Duty to Provide Information.

(1) The permittee shall furnish to the Department and the local County Conservation District, if acting as the processing entity, within a reasonable time, any information that the Department or the local County Conservation District may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

(2) The permittee shall furnish to the Department and the local County Conservation District, if acting as the processing entity, upon request, copies of records required to be kept by this permit.

(3) When the permittee becomes aware that it failed to submit any relevant facts or submitted incorrect information in the permit application or in any other report to the Department, or the local County Conservation District if acting as the processing entity, it shall promptly submit such facts or information.

(4) The permittee shall give advance notice to the Department, and the local County Conservation District if acting as the processing entity, of any planned physical alterations, including facility expansions, or additions to the permitted activity. The permittee shall notify the Department and the local County Conservation District of any changes in the construction activities which will result in increased sediment loading prior to the modification.

c. <u>Signatory Requirements</u>.

All Permit Applications (including Transferee/Co-Permittee Applications), Notices of Termination (NOT), Erosion and Sediment Control plans, reports, certifications or information either submitted to the Department, a local County Conservation District, or the operator of a large or medium municipal separate storm sewer system, or that this permit requires be maintained by the permittee, shall be signed.

(1) All Permit Applications (including Transferee/Co-Permittee Applications), and Notices of Termination (NOT) shall be signed as follows:

(a) For a corporation: by a responsible corporate officer. For the purposes of this part, a responsible corporate officer means: (1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (2) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars) if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

(b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(c) For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this part, a principal executive officer of a federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

(2) All reports required by the permit and other information requested by the Department or a local County Conservation District shall be signed by a person described above or by a duly authorized representative of that person.

A person is a duly authorized representative only if:

(a) The authorization is made in writing by a person described above and submitted to the Department or the local County Conservation District with the reports.

(b) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).

(3) Changes in Authorization.

If an authorization is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part B.1.c must be submitted to the Department and the local County Conservation District if acting as the processing entity, prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. <u>Transfer of Ownership or Control</u>.

(1) This permit is not transferable to any person except after notice has been provided to the Department or the local County Conservation District, if acting as the processing entity, and upon written approval by the Department or the local County Conservation District, as appropriate.

(a) In the event of any pending change in control or ownership of the facilities or construction activities from which the authorized discharges emanate, the permittee shall notify the Department, and the local County Conservation District if acting as the processing entity, by submitting the form entitled "Transferee/Co-Permittee Application" at least 30 days prior to the change in ownership or control.

(b) The Transferee/Co-Permittee Application form shall be accompanied by a written agreement between the existing permittee and the new owner or operator (transferee or co-permittee) stating that if the permit is being transferred the existing permittee shall be liable under the permit for violations of the permit up to and until the date of coverage transfer and that the new owner or operator (transferee) shall be liable under the permit for permit violations from that date on. If a new co-permittee is being added, the

written agreement between the existing permittee and the new co-permittee shall state that the existing permittee shall be liable under the permit up to and until the date the new co-permittee is added to the permit and that both co-permittees shall be jointly and severally liable under the permit for permit violations from that date on.

(c) After receipt of the above required documentation, the Department, or local County Conservation District if acting as the processing entity, shall notify the existing permittee and the new owner or operator (transferee or co-permittee) of its decision concerning approval of the transfer.

(d) Discharge Monitoring Reports and any other report forms required under the permit shall have the names changed to reflect a transfer of ownership.

(2) For purposes of this permit, operators shall include general contractors. If, prior to construction activities, the owner is the permittee and an operator/general contractor is later identified to become a co-permittee, the co-permittee/applicant shall submit to the Department, or the local County Conservation District if acting as the processing entity, a properly completed Transferee/Co-Permittee Application form and the written agreement described in (1)(b) above at least 30 days prior to the change in ownership or control. For purposes of this permit, this modification is considered to be a minor permit modification.

e. Removed Substances.

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be managed or disposed of pursuant to the Solid Waste Management Act, 35 P.S. §6018.101, et seq., and regulations promulgated thereto, in a manner such as to prevent any pollutant from such materials from adversely affecting the environment.

f. Facilities Operation.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee as efficiently as possible to achieve compliance with the conditions of this permit and with the requirements of erosion and sediment control plans. Proper operation and maintenance includes, but is not limited to, effective performance based on designed facilities capabilities, adequate staffing and training, and adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

g. Remediation Loss or Failure of BMPs or Treatment Facilities.

Upon reduction, loss or failure of any BMP or treatment facility, in order to maintain compliance with its permit, the permittee shall control the construction activities and any associated discharges to ensure that there is no pollution discharged to surface waters of the Commonwealth until the BMP or treatment facility is rebuilt or repaired, or an alternative BMP or treatment facility is provided. This requirement is applicable in situations where the BMP or treatment facility is rendered ineffective, whether the cause or source of the reduction, loss or failure is within or beyond the control of the permittee.

h. Adverse Impact.

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

2. RESPONSIBILITIES

a. Duty to Comply.

The permittee must comply with all conditions of this permit. Any permit non-compliance constitutes a violation of the Pennsylvania Clean Streams Law and the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

b. Penalties for Violations of Permit Conditions.

(1) Criminal.

(a) **Negligent Violations.** The CWA provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both. In addition, Section 602 of the Clean Streams Law provides criminal penalties for violations of permit conditions.

(b) **Knowing Violations.** The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than three years, or both. In addition, Section 602 of the Clean Streams Law provides criminal penalties for violations of permit conditions.

(c) **Knowing Endangerment.** The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both. In addition, Section 602 of the Clean Streams Law provides criminal penalties for violations of permit conditions.

(d) **False Statement.** The Clean Water Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act shall, upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both. (See Section 309(c)(4) of the Clean Water Act). In addition, the provisions of the Pennsylvania Crimes Code relating to False Swearing and Unsworn Falsification provide criminal sanctions for such actions. See 18 Pa. C.S. §§4903-4904.

(2) Civil Penalties. The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Act is subject to a civil penalty not to exceed $25,000 per day for each violation. In addition, Section 605 of the Pennsylvania Clean Streams Law provides for penalties of up to $10,000 a day for violations of permit conditions, for each separate offense.

(3) Administrative Penalties. The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Act is subject to an administrative penalty, as follows:

(a) **Class I penalty.** Not to exceed $10,000 per violation nor shall the maximum amount exceed $25,000.

(b) **Class II penalty.** Not to exceed $10,000 per day for each day during which the violation continues nor shall the maximum amount exceed $125,000.

c. Need to Halt or Reduce Activity not a Defense.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

d. Property Rights.

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, Pennsylvania or local laws or regulations.

e. Severability.

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

f. Other Laws.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable Pennsylvania law or regulation under authority preserved by Section 510 of the Clean Water Act, 33 U.S.C. Section 1361, or under Section 311 of the CWA, 33 U.S.C. Section 1321.

g. Right of Entry.

Pursuant to Sections 5(b) and 305 of Pennsylvania's Clean Streams Law (35 P.S. §§691.5(b) and 691.305), 25 Pa. Code Chapter 92, and §1917-A of the Administrative Code, the permittee shall allow the head of the Department, the EPA Regional Administrator, and/or authorized representatives of EPA, DEP, and the local County Conservation District, or, in the case of a facility which discharges to a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents, as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit; and

(2) At any reasonable time, have access to and copy any records that must be kept under the terms and conditions of this permit; inspect any facilities or equipment (including monitoring and control equipment) and sample any substances or discharge at any location.

3. **DEFINITIONS**

a. **"Best Management Practices (BMPs)"** means activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce pollution to waters of the Commonwealth. BMPs include properly designed and implemented Erosion and Sediment Control plans; Preparedness, Prevention, and Contingency (PPC) plans; Storm Water Management plans; Pollution Prevention plans; and other treatment requirements, operating procedures, and practices which minimize or eliminate runoff, spillage, leaks, and other drainage from the construction activity.

b. **"CWA"** means the Clean Water Act or the Federal Water Pollution Control Act.

c. **"Department"** means the Department of Environmental Protection of the Commonwealth.

d. **"Large and medium municipal separate storm sewer system"** means all municipal separate storm sewers that are either:

(a) Located in an incorporated place with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census; or

(b) Located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or

(c) Owned or operated by a municipality other than those described in paragraph (a) or (b) and that are designated by the Director as part of the large or medium municipal separate storm sewer system.

e. **"Municipality"** means any county, city, borough, town, township, school district, institution or any authority created by one or more of the foregoing. For the purposes of this definition, a town shall mean an unincorporated town.

f. **"Outfall"** means point source as defined by 25 Pa. Code Section 92.1 which is any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft from which pollutants are or may be discharged.

g. **"Person"** shall be construed to include any natural person(s), partnership, association, corporation, business organization, or any agency, instrumentality or entity of Federal or State Government. Whenever used in any clause prescribing

and imposing a penalty, or imposing a fine or imprisonment, or both, the term "person" shall not exclude the members of an association and the directors, officers, or agents of a corporation.

h. **"Processing entity"** - for the purpose of this permit, shall generally mean the local County Conservation District if the District is also participating as the reviewing entity for coverage under the NPDES general permit for storm water discharges from construction activities. Persons seeking an individual NPDES permit must contact the local County Conservation District in the county in which the construction activity is located to ascertain if the District is participating as the entity processing individual NPDES permit applications. The Department is the processing entity in a given county if the local County Conservation District chooses not to participate in the review of Notices of Intent (NOI) for coverage under the General Permit for Discharges of Storm Water from Construction Activities and in the processing of applications submitted for the Individual NPDES Permit.

i. **"Runoff coefficient"** means the fraction of total rainfall that will appear at the conveyance as runoff.

j. **"Stabilization"** means the proper placing, grading and/or covering of soil, rock or earth to insure its resistance to erosion, sliding or other movement. The standard for vegetative cover to be a uniform coverage or density is 70% across the disturbed area.

k. **"Storm water"** means storm water runoff, snow melt runoff, and surface runoff and drainage.

l. **"Storm water associated with construction activity"** means the discharge into surface waters of the Commonwealth, municipal separate storm sewers, or non-municipal separate storm sewers from any conveyance which is used for collecting and conveying storm water and which is related to construction activities. Construction activities including clearing, grading and excavation activities except: operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale. The term does not include non-point source storm water discharges from silvicultural activities (See §92.4(a)(4) for a definition of "silvicultural point sources").

m. **"Surface waters of the Commonwealth"** shall mean any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, ponds, springs and all other bodies or channels of conveyance of surface water, including wetlands, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

PART C

OTHER CONDITIONS

1. PROHIBITIONS ON NON-STORM WATER DISCHARGES

All discharges covered by this permit shall be composed entirely of storm water associated with construction activities. Discharges other than storm water must be in compliance with an NPDES permit (other than this permit) issued for the discharge.

2. EROSION AND SEDIMENT CONTROL PLANS

An Erosion and Sediment Control (E&S) Plan must be developed and implemented for each activity covered by this permit. Each plan must be submitted to and approved by the appropriate Conservation District, or its designee, prior to the authorization to discharge under this permit. E&S Plans must be prepared in accordance with the Bureau of Water Quality Protection, Division of Waterways, Wetlands and Erosion Control "Erosion and Sediment Pollution Control Program Manual", Chapter 102 of the Department's Rules and Regulations, and additional requirements contained herein. Applicable requirements specified in submitted E&S Plans and any changes or revisions to the Plan if it is revised during the permit term are, upon authorization to discharge under this permit, incorporated by reference.

Feasibility of the E&S Plan, structural design and proper construction methods are the responsibility of the permittee. Failure of the control measures and facilities to achieve their intended purpose may require additional or modified control measures and facilities to be designed and constructed. Any changes to the approved E&S Plan, including changes to control measures and facilities or the points of discharge, must be submitted to the processing entity for review and approval prior to initiating the activity.

Prior to the start of operations at any spoil, borrow or other work area not detailed on the approved E&S Plan, whether located within or outside of the indicated construction limits, the permittee shall develop and have approved by the processing entity, a separate E&S Plan for each site.

The permittee shall contact the processing entity for clarification of any requirements contained in the E&S Plan.

E&S Plans required under this permit are considered reports that shall be available to the public under Section 607 of the Clean Streams Law, and §92.63 of the Department's regulations. The owner or operator of a facility with storm water discharges covered by this permit shall make plans available to the public upon request by the public. E&S Plans must be made available at the site of the construction activity.

3. PROPER DISPOSAL OF BUILDING WASTE

All construction/demolition wastes composed of building materials must be removed from the site and disposed of in accordance with the Department's Solid Waste Management Regulations at 25 Pa. Code §260.1 et seq., §271.1 et seq., and §287.1 et seq. No construction/demolition wastes or unused building materials shall be buried, dumped, or discharged at the site.

4. APPROVED STATE OR LOCAL PLANS

Facilities which discharge storm water associated with construction activities must include in their E&S Plan procedures and requirements specified in approved watershed storm water management plans, including local storm water management ordinances developed pursuant to the Pennsylvania Storm Water Management Act (P.L. 864; No. 167, Oct. 4, 1978). Applicable requirements specified in watershed storm water management plans approved by State or local officials are, upon authorization to discharge under this general permit, incorporated by reference.

5. ADDITIONAL NOTIFICATION

Facilities with at least one storm water discharge associated with construction activity to a large or medium municipal separate storm sewer system (systems serving a population of 100,000 or more) in addition to maintaining copies of discharge monitoring reports in accordance with Part A.3, must submit, when directed to do so, signed copies of monitoring results on Discharge Monitoring Report Forms to the operator of the municipal separate storm sewer system.

6. PREPAREDNESS, PREVENTION AND CONTINGENCY PLANS

If the potential exists for causing accidental pollution of air, land, or water, or for causing endangerment of public health and safety through accidental release of toxic, hazardous, or other polluting materials, the permittee must develop a Preparedness, Prevention and Contingency (PPC) Plan. The PPC Plan shall be developed in accordance with 25 Pa. Code §101.3. The PPC Plan shall identify areas which may include but are not limited to waste management areas; raw material storage areas; temporary and permanent spoils storage areas; maintenance areas; and any other areas that may have the potential to cause noncompliance with the terms and conditions of this permit due to the storage, handling, or disposal of any toxic or hazardous substances such as oil, gasoline, pesticides, herbicides and solvents, etc. Best management practices shall be developed and implemented for each identified area. The PPC Plan shall be maintained on-site at all times and shall be made available for review at the request of the Department or the local County Conservation District.

7. ADDITIONAL OPERATIONAL, MAINTENANCE, INSPECTION, ETC. REQUIREMENTS

a. If the earthmoving activities authorized by this permit at any time create conditions that cause or threaten to cause pollution to waters of the Commonwealth, the permittee shall immediately implement remedial measures to correct the conditions.

b. The permittee shall notify the County Conservation District and the Regional Office, Soils and Waterways Section, by telephone or certified mail, at least seven days before construction is to begin. Both parties shall be invited to a pre-construction conference with the person(s) undertaking the earthmoving activity.

c. The erosion control measures and facilities shall be constructed and maintained under the supervision of a competent individual trained and experienced in erosion control.

d. The staging of earthmoving activities and maintenance directions contained in the plan must be closely followed. Frequent inspections shall be conducted by the permittee to detect impairment of the controls. Repairs to impaired erosion control measures and facilities must be made immediately.

e. Sediment shall at no time accumulate in control measures or facilities to a depth sufficient to limit storage capacity or interfere with the settling efficiency or functioning of the device. Sediment shall be removed and stabilized in a manner that will not create pollution.

f. Discharges of sewage or industrial waste to erosion control measures and facilities are not permitted.

g. The permittee shall notify the processing entity when all areas of earthmoving are stabilized so that a final inspection of the site may occur.

h. Issuance of this permit does not authorize earthmoving activities in delineated wetlands as depicted in the approved E&S Plan. Any changes to the approved plan resulting from other permits from the Department that authorize activity in wetlands must be submitted to the processing entity for review and approval prior to initiating the activity.

8. SPECIAL CONDITION

The permittee and co-permittee must ensure that visual site inspections are conducted as part of a maintenance program by qualified personnel, trained and experienced in erosion and sediment control, to ascertain that the BMPs are operational and effective in preventing pollution to waters of the Commonwealth. The maintenance program shall provide for inspection of BMPs on at least a weekly basis and after each measurable rainfall event, including the repair of the BMPs to ensure effective and efficient operation. A written report of each inspection shall be kept on file at the site, and include:

(1) A summary of site conditions, BMPs, and compliance; and
(2) The date, time, and name of the person conducting the inspection.

SECTION 01050

JOB CONDITIONS

PART 1 GENERAL

1.1 LAYOUT OF WORK

1.1.1 Location of Bench Marks and Control Points

The Government has established bench marks and horizontal control points at the site of the work. Locations and values for these survey control points are indicated on contract drawings. These points are described and tie-downs shown on the attached sheets at the end of this section.

1.1.2 Layout Using Control Points

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.

1.1.3 Minimum Requirements

The bench marks and control points 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.

1.1.4 Tools, Labor and Markers

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 Transportation Facilities

Olyphant is located in Lackawanna County, PA, northeast of Scranton. Major access routes are Interstate Routes 81, 476, 380 and 84.

1.2.2 Explorations

The physical conditions indicated on the drawings and in the specifications are the result of site investigations by soil and rock borings, including borings investigating for the presence of hazardous and toxic waste materials. Foundation exploration logs and laboratory test results are attached to the end of this section. Whenever subsurface exploration logs are presented in the contract documents, soil test results are available for inspection in the Baltimore District, Corps of Engineers, Geotechnical Engineering Branch, Room 9250, City Crescent Building, 10 South Howard Street, Baltimore, Maryland. Soils and rock samples are also available for inspection; however, prospective bidders are required to call (410) 962-2002 between the hours of 9:00 a.m. and 3:30 p.m., Monday through Friday (excluding Federal Holidays), a minimum of 24 hours in advance to arrange a time and date for the inspection of the samples.

1.2.3 SITE CATEGORIZATION

See "Site Conditions - Lackawanna Flood Protection Project, Olyphant, PA," attached to the end of this section.

1.3 SUBMITTALS

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

SD-07 Schedules

Shut Down Utility Services; GA|AR.

Prior approval for service/utility interruptions.

Advance Notice; FIO.

When changes and/or relocations are required.

Checklist; GA|AR

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

Engineering Assessment; GA|AR

Crib wall temporary support.

Traffic Control Plan; GA|AR.

Contractor's proposed traffic control measures.

SD-18 Records

Utility Coordination Records; FIO.

Documentation of utility coordination.

Work Plans; GA|AR.

Contractor's method of personnel and equipment control around railroads.

Agreements and Correspondence; FIO.

Railroad-related documentation.

1.4 UTILITIES

As provisions in this paragraph may affect private property owners and local utility companies, communications and agreements between the Contractor and landowner, or Contractor and utility company, including payment for utilities, shall be done in coordination with the Contracting Officer. The Contractor shall submit a copy of all utility coordination records to the Contracting Officer after appropriate payment has been made to applicable sources, and utility hookups have been disconnected.

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. No utility lines shall be erected or strung which will interfere with private landowners, local business or obstruct traffic. The Contractor is to ensure that the local utility company makes no hookups which may affect utility service of any private landowners or local businesses (i.e., brownouts, decreased voltage or power surges). 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 Santitation Facilities

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Toilet facilities in private residences or businesses will not be available to Contractor's personnel.

1.4.3 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 appropriate utility company and 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 the appropriate utility company and the Contracting Officer.

i. Shutoffs which will cause interruption of local Government work operations or private landowner utilities as determined by the Contracting Officer shall be accomplished during times determined by the appropriate utility company and the Contracting Officer without any additional cost to the Government.

j. Operation of valves on water mains will be by local utility company 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 local utility company inspector has determined that all items serviced by the gas line have been shut off. (CENAB)

1.4.4 Pennsylvania Requirements

Other Pennsylvania State utility requirements are shown on the drawings.

1.4.5 Local Utility Companies

Utility companies and point of contacts that oversee various utilities in the Borough of Olyphant are listed below. The Contractor shall notify the appropriate company a minimum of seven days before working on their facilities.

Pennsylvania One Call System, Inc.
925 Irwin Road, West Mifflin, PA 15122-1078
1-800-242-1776

Pennsylvania Department of Transportation
Attn: Permit Unit
Engineering District 4-0
P.O. Box 111
Scranton, PA 18501
(717)963-3311

Olyphant Borough (Sewer Collector System)
Mr. Jack Giordano
113 Willow Street
Olyphant, PA 18447
(570)489-8503
Atty. C.J. Mustacchio
114-116 Lackawanna Avenue
Olyphant, PA 18447
(570)489-1220

Lackawanna River Basin Sewer Authority
Sewer Interceptor System
Mr. Dominic Surace, P.E.
P.O. Box 9068
Dickson City, PA 18519
(570)489-7563

Mr. Tim Francis
P G Energy
1010 Bridge Street
Scranton, PA 18503
(570)348-3861

Mr. Peter Sarmonis
Pennsylvania American Water
100 N Pennsylvania Avenue
Wilkes-Barre, PA 18701
(570)830-6540

Mr. Tom Baumgardner (Distribution System)
Pennsylvania Power & Light Company
600 Larch Street
Scranton, PA 18509-2420
(570)348-1564

Mr. John Kelhart (Transmission System)

PPL Electric Utilities Corporation
Two North Ninth Street, GENTW19
Allentown, PA 18101-1179
(610)774-6287

Mr. Jim Graff Verizon
121 Adams Avenue, 5th Floor
Scranton, PA 18503
(570) 348-5600

Mr. Donald J. O'Boyle, P.E.
Consulting Engineer - Olyphant (Electric)
1422 Main Street
Peckville, PA 18452
(570)489-0542

1.4.6 Alterations to Utilities: (AUG 1968)

Where changes and relocations of utility lines are noted on drawings or in the specifications to be performed by the local utility company, the Contractor shall give the Contracting Officer at least thirty days' written notice in advance of the time that the change or relocation is required. In the event that, after the expiration of thirty days after the receipt of such notice by the Contracting Officer, such utility lines have not been changed or relocated and delay is occasioned to the completion of the work under this contract, the Contractor will be entitled to a time extension equal to the period of time lost by the Contractor after the expiration of said thirty day period. Any modification to existing or relocated lines required as a result of the Contractor's method of operation shall be made wholly at the Contractor's expense and no additional time will be allowed for delays incurred by such modifications. (CENAB)

1.4.7 Utility Markings

The Contractor shall contact the local utility companies and the One-Call Service, a minimum of 14 days and 48 hours, respectively, prior to any excavation requesting utility location markings. The Contractor shall not proceed with any excavation until all utilities, including abandoned utilities, have been marked to the satisfaction of the Contracting Officer. Prior to requesting the marking of utilities, the Contractor shall stake out proposed excavations and limits of work with white lines ("White Lining"). It is the Contractor's responsibility to ensure that all permits (excavation or otherwise, including local utility permits) are current and up-to-date without expiration. In addition to the above requirements the Contractor shall:

a) Visually survey and verify that all utility markings are consistent with existing appurtenances such as manholes, valve boxes, poles, pedestals, pad-mounted devices, gas meters, etc. prior to any excavation.

b) Hand dig test holes to verify the depth and location of all utilities prior to any mechanical excavation within the limits of

work. Other non-damaging methods for utility verification, as indicated in (d) below, may be considered subject to approval by the Contracting Officer. Also, verify that any abandoned utilities are not active.

c) Preserve all utility markings for the duration of the project to the furthest extent possible.

d) When excavation is performed within 2 feet of any utility line, a non-damaging method of excavation shall be used. The non-damaging method shall be hand digging. Other non-damaging methods, such as, soft digging, vacuum excavation, pneumatic hand tools, may be considered subject to approval by the Contracting Officer.

e) Regardless of the type of excavation, the Contractor shall notify the Contracting Officer a minimum of 72 hours prior to any excavation activity. Failure to notify the Contracting Officer can result in the issuance of a "Stop Work" order, which shall not be justification for contract delay or time extension. The Government reserves the right to have personnel present on site during any type of excavation.

f) The Contractor's Quality Control System Manager shall ensure that all excavation requirements herein are met at the time of the preparatory phase of quality control, and that the excavation procedures are reviewed during the preparatory phase meeting. This preparatory phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.

g) Any work other than excavation in the vicinity of a utility, that could damage or interrupt a utility, such as, exterior or interior work near transformers, power lines, poles, above ground gas lines, gas meters, etc., shall be done with extreme care. The Contractor shall specifically note during the preparatory phase of quality control, the construction techniques to be used to preclude damaging or interrupting any utility. This preparatory phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.

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

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

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

1.6 CONSTRUCTION IMPACT ON STREETS: (DEC 1975)

1.6.1 General

When operations in connection with contract work necessitate the full or partial 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 PADOT-approved barricades, signs, markers, flares, and other devices as may be required by the Contracting Officer for traffic guides and public safety. All detours must be approved by Olyphant Borough and PADOT through the Contracting Officer prior to implementation. (CENAB)

1.6.2 Traffic Control Plan

The Contractor shall submit to the Contracting Officer for approval a traffic control plan. This plan shall include narrative and drawings showing proposed measures when construction operations affect vehicle flow and full or partial street closures. Both PADOT and the Olyphant Borough must approve the plan before any measures are implemented.

1.6.3 Highway Occupancy Permit

The Borough Engineer is obtaining the Highway Occupancy Permit on behalf of the Borough of Olyphant. The Contractor shall follow the requirements of the permit as well as the narrative below.

MAINTENANCE AND PROTECTION OF TRAFFIC NARRATIVE
GARFIELD AVE STORMWATER SYSTEM
OLYPHANT BOROUGH, LACKAWANNA COUNTY, PA

To complete the installation of the Stormwater System along Garfield Avenue, the Contractor must provide and maintain the following maintenance and protection of traffic systems. The Contractor must use appropriate trenching and shoring methods to provide safe working conditions while minimizing traffic and roadway disturbance.

1.6.3.1 Phase 1 - Install 72" inch pipe from new endwall at the downstream end to the western side of East Lackawanna Avenue

a. Most of this work will be beyond the limits of pavement and will not interfere with traffic or require signing or traffic control.

b. Install the final 15' of the 72" pipe, as well as Inlet #4 under daytime conditions, with flagging, as necessary to control traffic. With

flagging, there is sufficient roadway width available to maintain all traffic movements across East Lackawanna Avenue and through the signalized intersection.

c. While working along the western curbline of East Lackawanna Avenue, provide temporary traffic signal pole(s) to support signal heads 3, 4, 8 and 9 on pole #4. Upon completion of the 72" pipe, replace pole 4 and the two-inch conduit, which runs from Junction Box 4 to Junction Boxes 5 and 6.

1.6.3.2 Phase 2 - Install 60" pipe between Inlet #4 and Inlet #5 using half width construction across East Lackawanna Avenue

a. Phase 2A: Install the 60" pipe from Inlet #4 to the centerline of East Lackawanna Avenue, maintaining one lane of vehicular traffic in each direction and pedestrian traffic on the eastern side of East Lackawanna Avenue. Backfill all pavement cuts to grade overnight. Upon completion of this work, construct temporary pavement, 4' wide, along the western side of East Lackawanna Avenue.

b. Phase 2B: Install the 60" pipe from the centerline of East Lackawanna Avenue to Inlet #5. Maintain East Lackawanna Avenue traffic (both vehicular and pedestrian) on the western side of the street, using the additional 4' of pavement provided on the western side of East Lackawanna Avenue.

Institute a detour for Garfield Avenue from the intersection of Garfield Avenue and East Lackawanna Avenue to 25 feet west of the intersection of Garfield Avenue and Lackawanna Avenue.

1. Detour westbound Garfield Avenue traffic onto North Valley Avenue to Delaware Avenue, and returning back to East Lackawanna Avenue. It will be necessary to install a temporary signal at the intersection of Delaware Avenue and East Lackawanna Avenue.

2. Detour eastbound Garfield Avenue Traffic to Delaware Avenue to North Valley Avenue and returning to Garfield Avenue with its intersection with North Valley Avenue.

3. Modify the traffic signal operation at South Valley Avenue, East Lackawanna Avenue and Garfield Avenue to omit the phase that serves Garfield Avenue.

4. Local northbound traffic on Pine Street will be detoured westbound onto Gravity Avenue, then northbound on East Scott Street to the signalized intersection of South Valley Avenue or eastbound on Gravity Avenue, then northbound on Lackawanna Avenue returning back to Garfield Avenue.

1.6.3.3 Phase 3 - Install 60" pipe, 54" pipe, 48" pipe and 36" pipe along Garfield Avenue, as well as all cross pipes and inlets.

Incrementally, institute a detour for both eastbound and westbound Garfield Avenue traffic. Between South Valley Avenue and Park Street along Garfield Avenue, close no more than two blocks at a time. Maintain driveway access to all drives on Garfield Avenue at all times.

a. Phase 3A: Install 60" pipe from Inlet #5 to Inlet #11, Inlets #6, #7, #8, #9, #10, #11 and #12 and associated cross pipes. Continue the Phase 2B detour.

b. Phase 3B: Install 60" pipe, 54" pipe, 48" pipe and 36" pipe from Inlet #11 to Inlet #30, Inlets #13 to #30 and associated cross pipes.

1. Continue the detour for Garfield Avenue as described in Phase 2B above. Detour local northbound traffic on Lackawanna Avenue, East Grant Street and Park Street westbound onto Gravity Avenue, then northbound on East Scott Street to the signalized intersection of South Valley Avenue.

2. Upon completing the installation of Inlet # 21, install loop detectors 5, 6, 7, and 8, and Junction Boxes 7 and 8, and the conduit runs. No splices will be allowed in the detector lead in cable.

Note: East Lackawanna Avenue and South Valley Avenue referenced above are synonymous with SR 347. SR 347 is South Valley Avenue for the portion south of Garfield Avenue, and becomes East Lackawanna Avenue for the portion north of Garfield Avenue.

1.6.4 Existing Crib Wall

The Contractor is responsible for monitoring and maintaining the stability and integrity of the existing crib wall during construction. Prior to construction, the Contractor shall submit to the Contracting Officer his engineering assessment, performed and signed by a registered P.E. in the Commonwealth of Pennsylvania. The engineering assessment shall show proposed means of providing any necessary temporary support to the crib wall and/or means of assuring that excavation, placement, and backfill operations will not endanger the stability of the crib wall. A means of monitoring for movement and other signs of distress, along with action levels, shall be part of the plan. The Contractor is responsible for repairing or rebuilding any portions of the wall that are damaged by his operations. See Sheet D-7, Typical Section of Garfield Avenue, for the location of the crib wall.

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

1.7.1 Protection of Equipment

All existing local Government or private citizen-owned 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.

1.7.2 Protection of Personnel

The Contractor shall protect personnel and spectators by installing safety

rails and/or barricades as applicable to prevent injury from unauthorized entry of personnel into work areas. PADOT-approved 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.

1.7.3 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)

1.8 ASBESTOS HANDLING AND REMOVAL:

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

1.9 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

1.9.1 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.

1.9.2 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
18	11	7	8	7	7	5	5	3	4	6	10

1.9.3 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)".

1.10 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.

1.11 QUANTITY SURVEYS

See Section 01270 MEASUREMENT AND PAYMENT.

1.12 DAMAGE TO WORK (1966 MAR HQUSACE)

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)

1.13 WORK ADJACENT TO RAILROAD PROPERTY

1.13.1 General

Part of the work to be performed under this contract is located adjacent to the existing right-of-way of the Delaware-Lackawanna Railroad. The Contractor shall so prosecute and conduct his work as not, at any time, to interfere with the safe operation of trains. The Contractor shall give timely notice to both the Lackawanna County Railroad Authority (570)963-6676 and the Delaware-Lackawanna Railroad (Mr. Forest Van Schwartz (570)343-4580) of any construction activity to be performed by the Contractor within the vicinity of the right-of-way that might require the railroad to provide personnel to safeguard the movement of trains. The cost of providing railroad watchmen, flagmen, or other personnel will be borne by the Contractor.

1.13.2 Work Plans

Plans for the control of the movement of Contractor's equipment and workmen in the vicinity of the right-of-way shall be submitted to the Contracting Officer, the Lackawanna County Railroad Authority and the Delaware-Lackawanna Railroad for approval. Plans shall include narrative and drawings. No work shall be done near the railroad right-of-way until plans have been approved.However, approval of the plans will not relieve the Contractor of any responsibility for the adequacy or safety of the operations.

1.13.3 Maintenance of Traffic

All work shall be performed without interrupting the railroad traffic. The cooperation of the railroad company will consist of providing flagmen at approaches to work sites and issuing slow orders to the train crews as the railroad deems necessary. It is anticipated that one (1) train per day in each direction Monday through Friday, will use the track past the construction site.

1.13.4 Liability Insurance

In addition to the requirements specified in clause 52.0228-4001 of the Solicitation, the Contractor, prior to commencement of the construction work associated with Option 1, shall procure, furnish, and keep in effect, until all work under the contract has been completed and accepted, insurance with policies in form acceptable to the Lackawanna County Railroad Authority naming the Lackawanna County Railroad Authority, "the" Delaware-Lackawanna Railroad Company, Inc., the County of Lackawanna and Commonwealth of Pennsylvania as additional insureds in the minimum amounts as detailed below. This policy must comply with the Standard Uniform Policy for Railroad Protective Liability and Property Damage Liability Insurance developed and in 1958 by the A.A.S.H.O. - A.A.R. If any part of the work is to be performed by a subcontractor, the prime Contractor shall carry in his own behalf insurance of the same limits as set forth in (a).

a. Railroad Protective Liability Insurance:
$2,000,000 per incident

$4,000,000 aggregate, for personal injury for death

b. General Liability Insurance:
$2,000,000 general aggregate
$2,000,000 products/completed operations aggregate
$2,000,000 personal injury
$1,000,000 property damage

c. Commercial Vehicle: $1,000,000 per occurrence

d. Commercial Umbrella: $6,000,000 per occurrence/annual aggregate

e. Workers Compensation:
$1,000,000 each employee
$1,000,000 each accident, such policy shall include a waiver of subrogation in favor of the Lackawanna Railroad Authority and its operator

1.13.5 Agreements and Correspondence

The Contractor shall furnish to the Contracting Officer prior to commencement of work, copies of all agreements, permits, approved schedules of operations, and pertinent correspondence relative to his negotiations with the Railroad Company.

1.13.6 Payment

Separate payment will not be made for the costs incurred by the Contractor in fulfilling any requirements of this special provision. (CENAB).

1.14 ENVIRONMENTAL LITIGATION

1.14.1 General

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.

1.14.2 Definitions

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)

1.15 WORKING HOURS AND NOISE

1.15.1 Working Hours

Working hours shall be 7:30 AM to 5:00 PM, Monday through Saturday. All work outside these hours must be coordinated with the Contracting Officer with possible input from the local government. No Sunday or holiday work will be permitted. PennDOT District 4-0 reserves the right to restrict work during peak hours, and to require work during off-peak hours as necessary.

1.15.2 Noise Outside Normal Working Hours

Construction noise outside of the 7:30 AM-5:00 PM working hours shall be minimized or severely restricted in residential and industrial areas as directed by the Contracting Officer.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

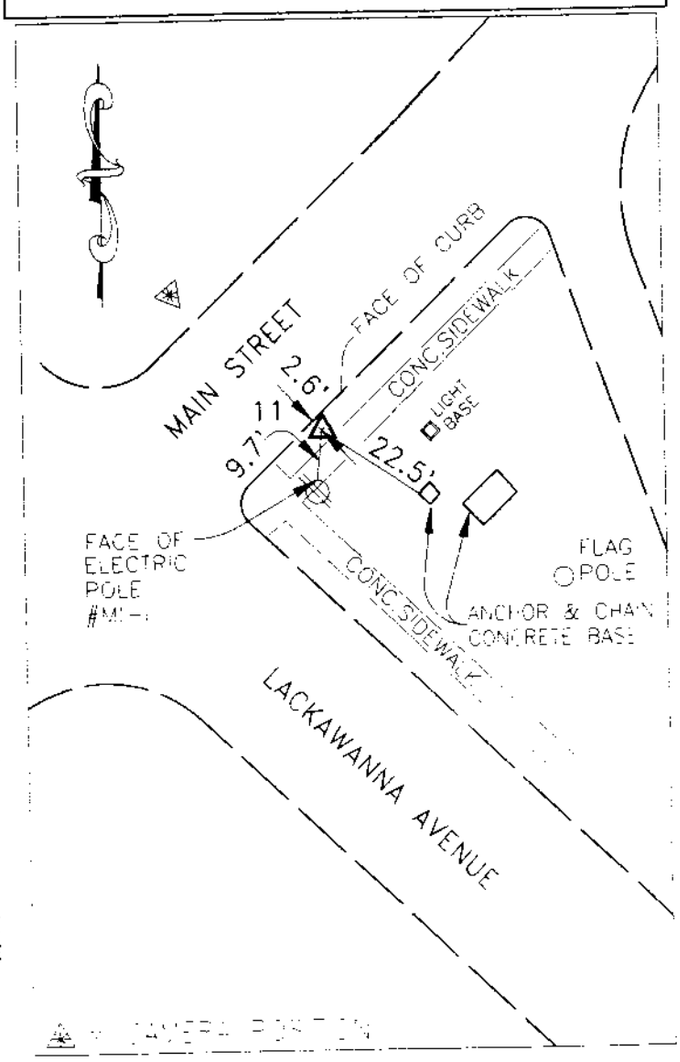
NOT APPLICABLE

-- End of Section --

GPS DATA

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

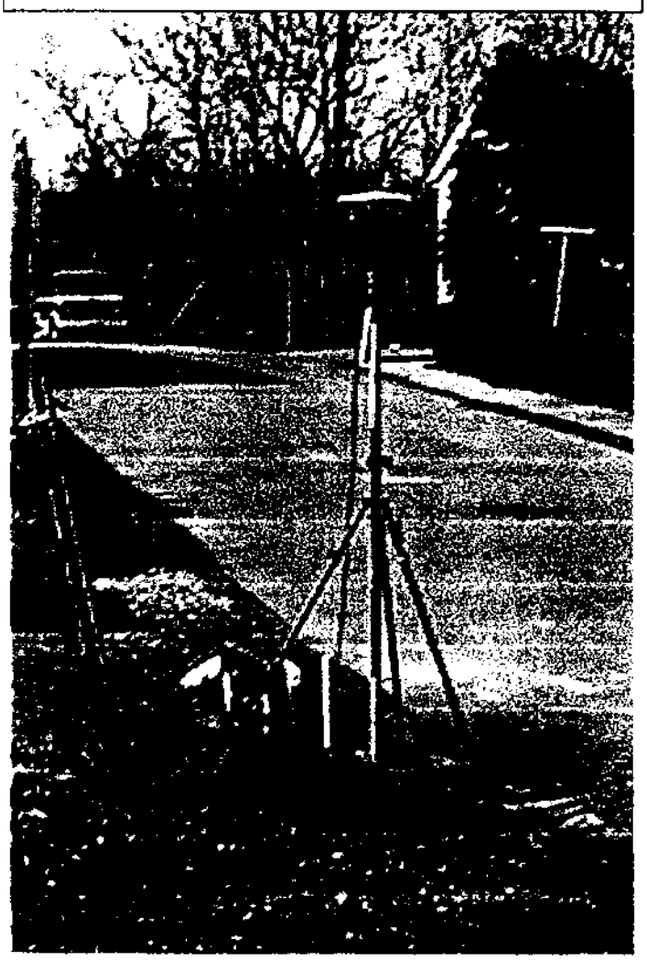
NAME OF STATION: GA MON #11 ☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997	**LOCATION METHOD** ☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE
1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)	**1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)**
NORTHING (Y) = 147103.598 EASTING (X) = 788525.435	NORTHING (Y) = 482622.387 EASTING (X) = 2587020.531
	MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929
	ELEVATION (FEET) = 772.748 ELEVATION (METERS) = 235.534
MONUMENT DESCRIPTION AND CONDITION COE BRASS DISC SET IN CONCRETE 0.2' BELOW THE SURFACE.	**TO REACH DESCRIPTION:** THE MONUMENT IS LOCATED IN THE GRASS STRIP ON THE S.E. CORNER OF THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. ON THE TOWNSHIP LINE BETWEEN DICKSON CITY & BLAKELY BOROUGH.

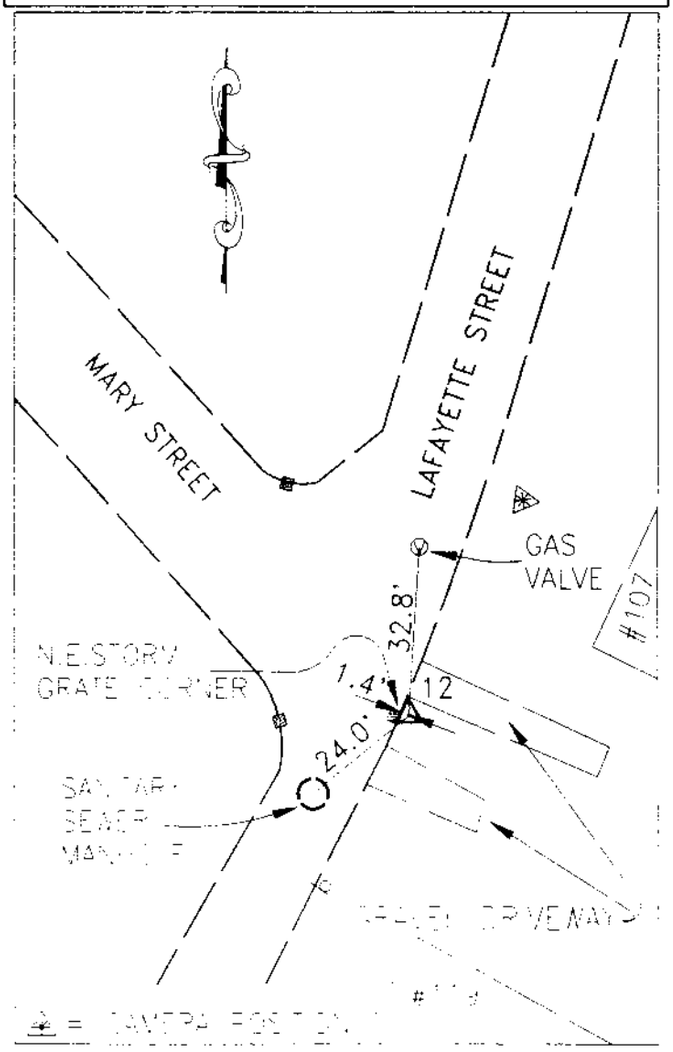


SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLyPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #12 ☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997	**LOCATION METHOD** ☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE
1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)	**1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)**
NORTHING (Y) = 146755.676 EASTING (X) = 788762.912	NORTHING (Y) = 481480.914 EASTING (X) = 2587799.653
	MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929
	ELEVATION (FEET) = 761.134 ELEVATION (METERS) = 231.994
MONUMENT DESCRIPTION AND CONDITION COE BRASS DISC SET IN CONCRETE 0.2' BELOW THE SURFACE.	**TO REACH DESCRIPTION:** FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.E. ON LACKAWANNA AVE. 0.15 MILES TO LAFAYETTE ST. PROCEED S.W. ON LAFAYETTE ST. 0.07 MILES TO MARY ST. THE MONUMENT IS ON THE S.E. SIDE OF THIS TEE INTERSECTION NEXT TO THE STORM GRATE.





SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #13

☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)

NORTHING (Y) = 147282.902
EASTING (X) = 789149.295

LOCATION METHOD

☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)

NORTHING (Y) = 483210.656
EASTING (X) = 2589067.311

MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929

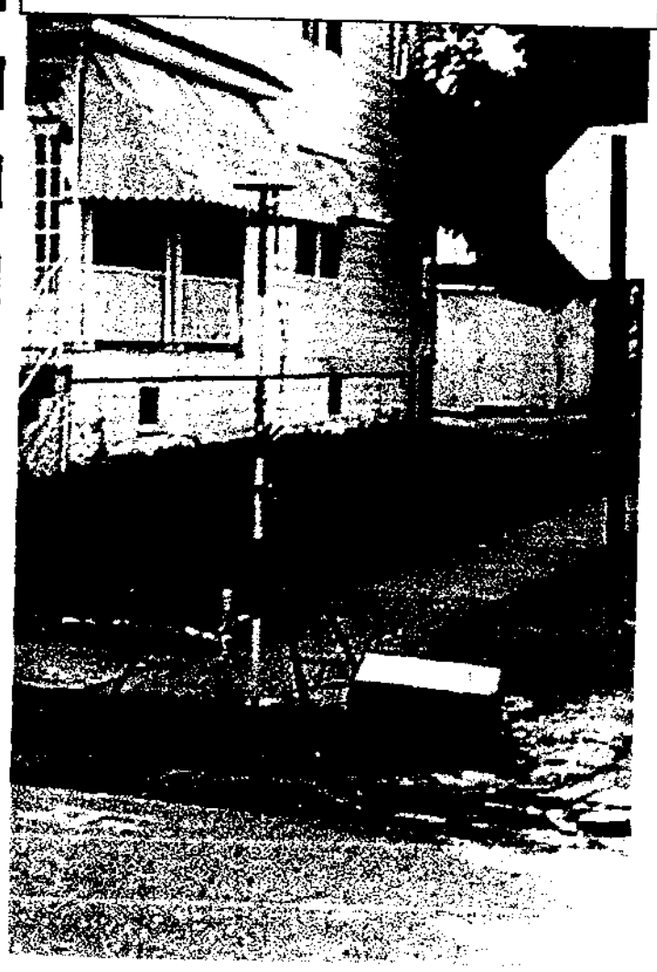
ELEVATION (FEET) = 766.104
ELEVATION (METERS) = 233.509

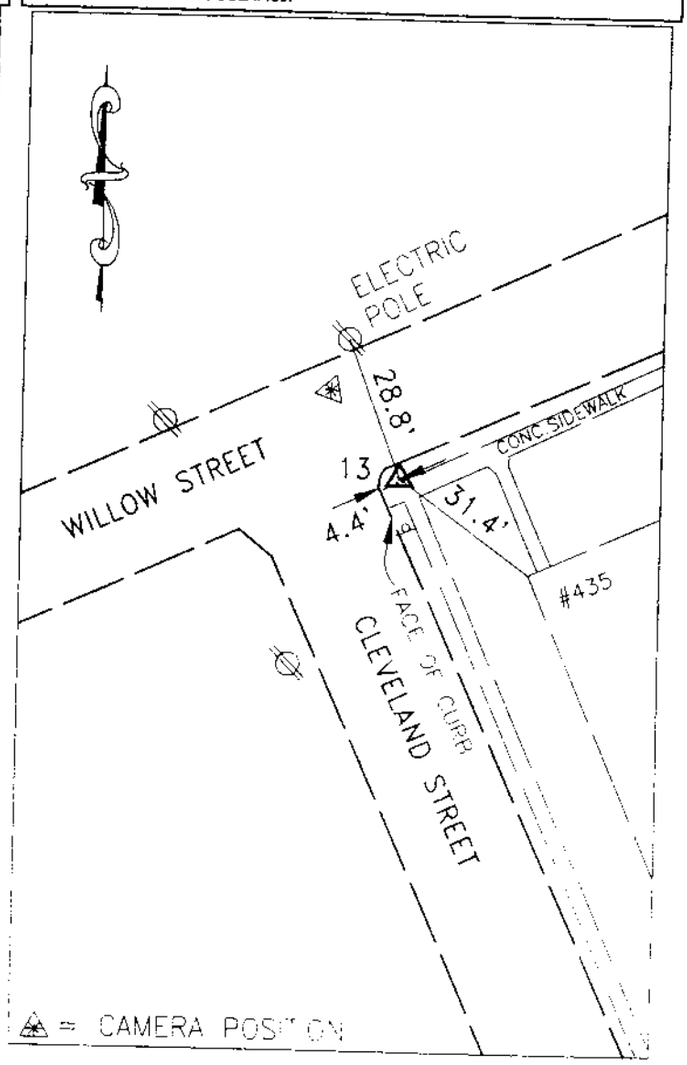
MONUMENT DESCRIPTION AND CONDITION

COE BRASS DISC SET IN CONCRETE 0.2' BELOW THE SURFACE.

TO REACH DESCRIPTION:

FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.E. ON LACKAWANNA AVE. 0.3 MILES TO DELAWARE AVE. PROCEED N.E. ON DELAWARE AVE. 0.3 MILES TO CLEVELAND ST. PROCEED N.W. ON CLEVELAND ST. 0.1 MILES TO A TEE INTERSECTION WITH WILLOW AVE. THE MONUMENT IS ON THE EAST CORNER OF THIS INTERSECTION IN THE GRASS STRIP IN FRONT OF HOUSE #435.

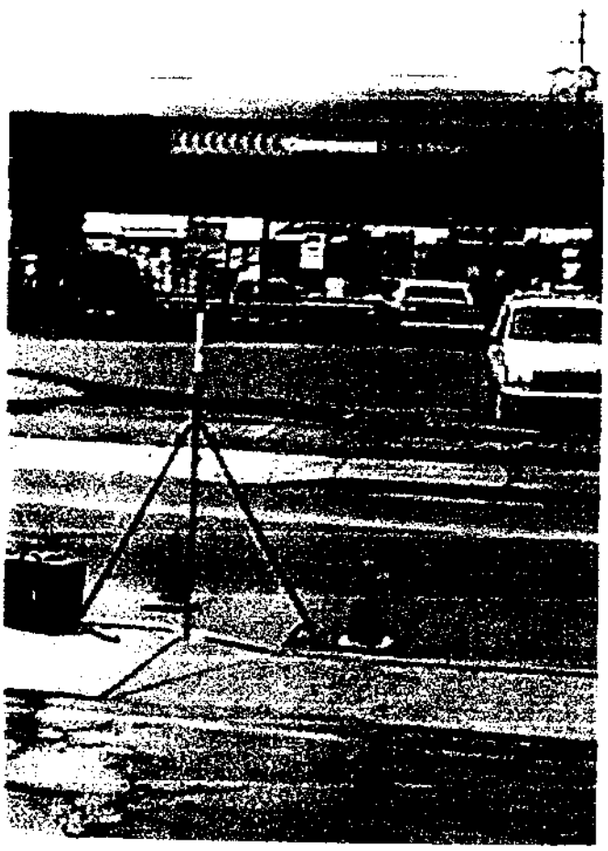


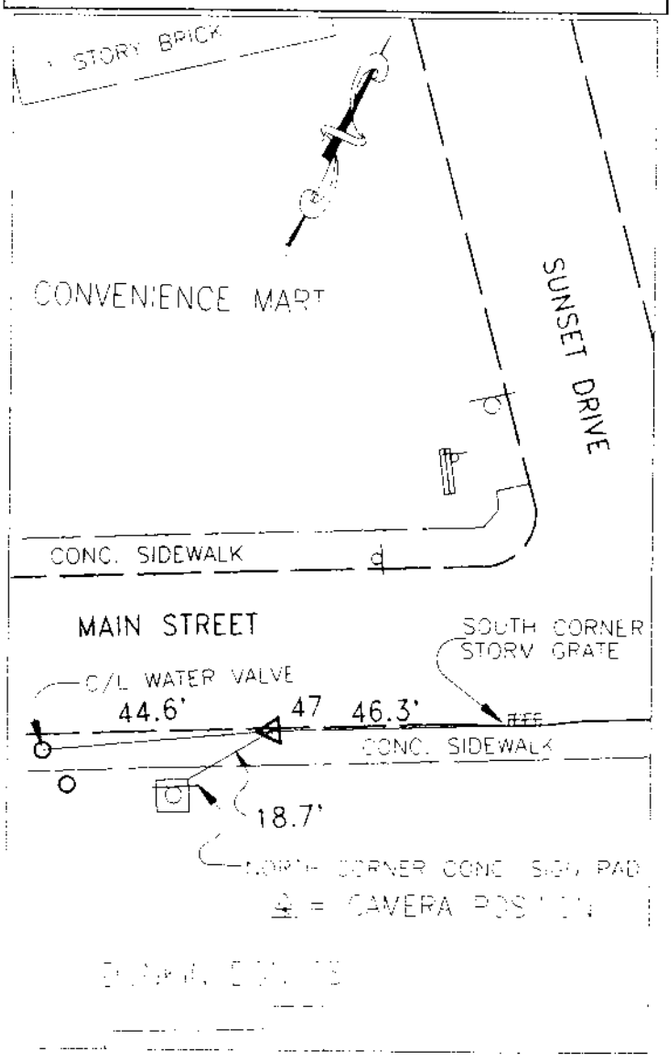


SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #47 ☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997	**LOCATION METHOD** ☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE
1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)	**1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)**
NORTHING (Y) = 146862.967 EASTING (X) = 788300.353	NORTHING (Y) = 481832.918 EASTING (X) = 2586282.074
	MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929
	ELEVATION (FEET) = 767.561 ELEVATION (METERS) = 233.953
MONUMENT DESCRIPTION AND CONDITION AD HUB & TACK SET FLUSH IN CONCRETE SURFACE.	**TO REACH DESCRIPTION:** FROM THE INTERSECTION OF LACKAWANNA AVE. & MAIN ST. IN DICKSON CITY, PROCEED S.W. ON MAIN ST. 0.2 MILES TO SUNSET DR. THE POINT IS ON THE CONCRETE CURB ON THE SOUTH SIDE OF THE STREET AT THE S.W. END OF THE NORTHERN CURB ENTRANCE TO THE DONUT SHOP.





VEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #49

☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997

LOCATION METHOD

☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)

NORTHING (Y) = 146871.684
EASTING (X) = 788782.000

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)

NORTHING (Y) = 481861.518
EASTING (X) = 2587862.278

MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929

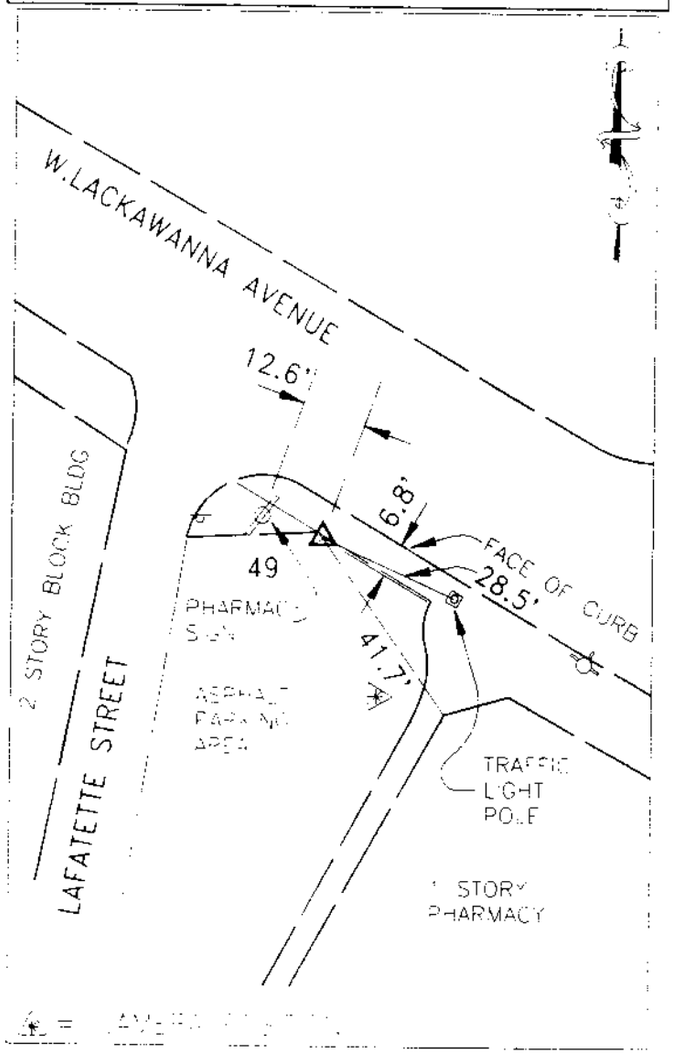
ELEVATION (FEET) = 765.376
ELEVATION (METERS) = 233.287

MONUMENT DESCRIPTION AND CONDITION

PK NAIL SET FLUSH WITH SURFACE.

TO REACH DESCRIPTION:

FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.E. ON LACKAWANNA AVE. 0.2 MILES TO LAFAYETTE ST. THE POINT IS ON THE S.E. CORNER OF THIS INTERSECTION IN THE N.W. CORNER OF THE PARKING LOT



SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #52

☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997

LOCATION METHOD

☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)

NORTHING (Y) = 147117.508
EASTING (X) = 789245.833

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)

NORTHING (Y) = 482668.024
EASTING (X) = 2589384.038

MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929

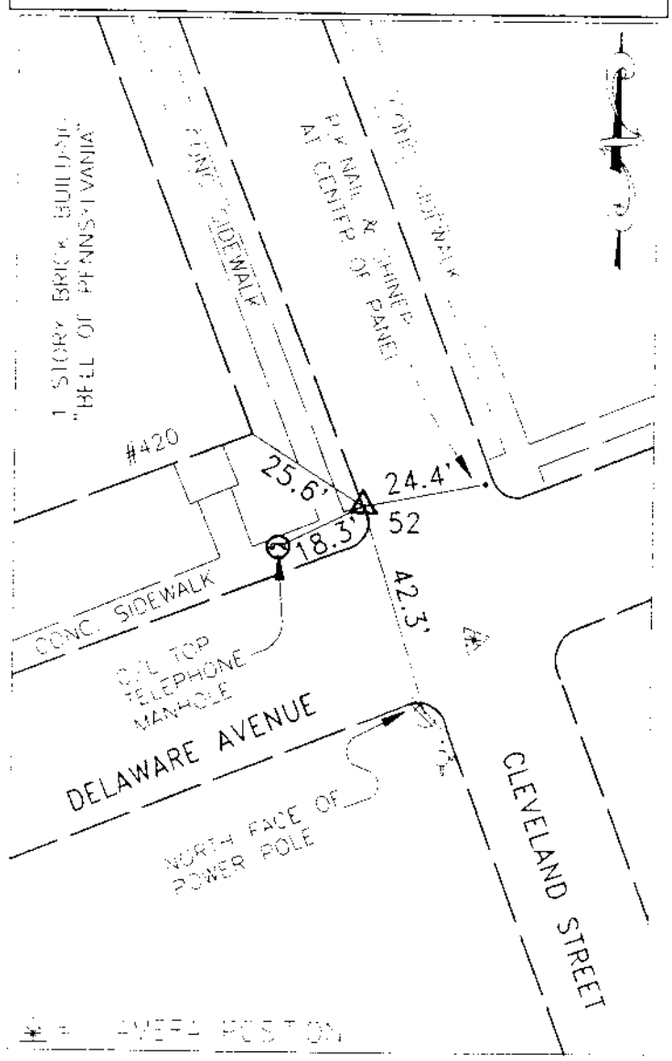
ELEVATION (FEET) = 800.149
ELEVATION (METERS) = 243.886

MONUMENT DESCRIPTION AND CONDITION

LEAD HUB & TACK SET FLUSH IN CONCRETE.

TO REACH DESCRIPTION:

FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.E. 0.25 MILES TO DELAWARE AVE. PROCEED N.E. ON DELAWARE AVE. 0.3 MILES TO CLEVELAND ST. THE POINT IS ON THE N.W. CORNER OF THIS INTERSECTION IN THE CONCRETE CURB.



SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #53

☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997

LOCATION METHOD

☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)

NORTHING (Y) = 147185.606
EASTING (X) = 789002.704

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)

NORTHING (Y) = 482891.441
EASTING (X) = 2588586.371

MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929

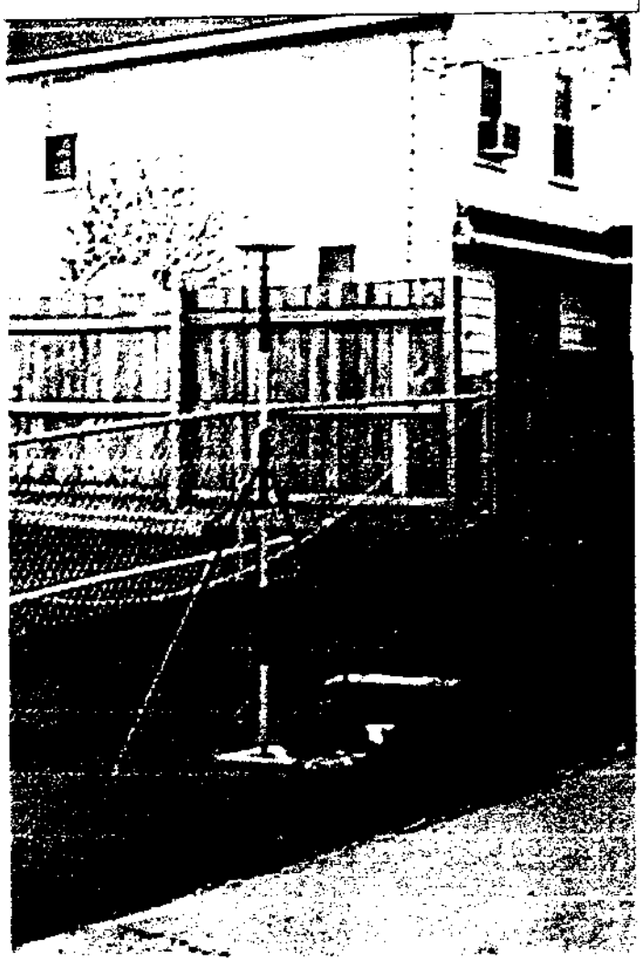
ELEVATION (FEET) = 763.949
ELEVATION (METERS) = 232.852

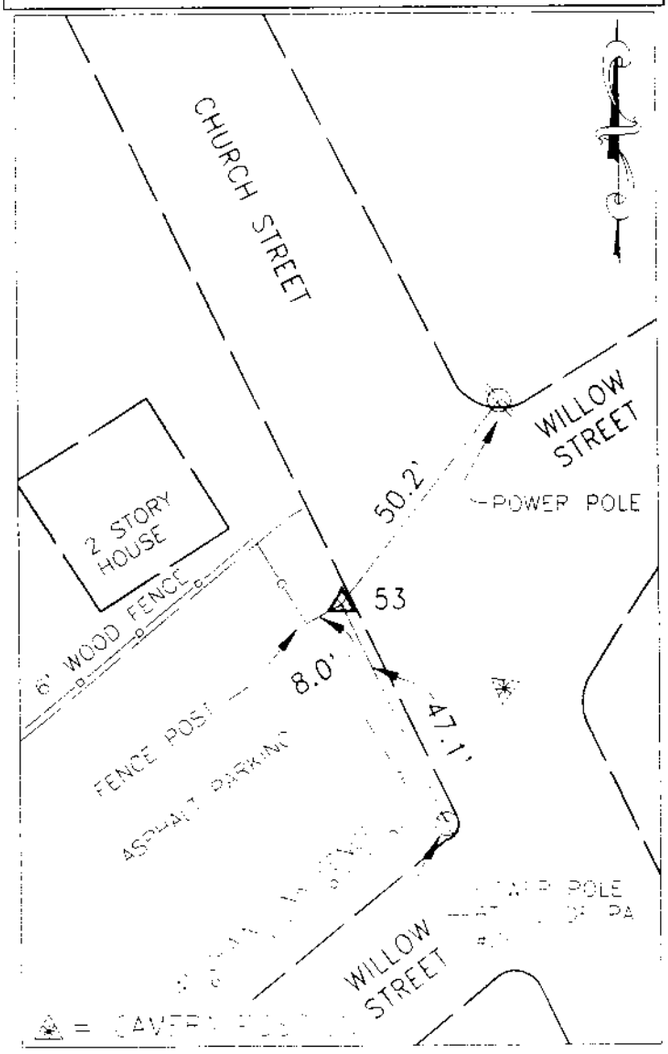
MONUMENT DESCRIPTION AND CONDITION

NAIL COUNTER SUNK IN ASPHALT 0.1' BELOW THE SURFACE.

TO REACH DESCRIPTION:

FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.E ON LACKAWANNA AVE. 0.25 MILES TO DELAWARE AVE. PROCEED N.E. ON DELAWARE AVE. 0.2 MILES TO CHURCH ST. PROCEED N.W. ON CHURCH ST. 0.1 MILES TO WILLOW ST. THE POINT IS ON THE S.W. CORNER OF THIS INTERSECTION AT THE ENTRANCE TO AN ASPHALT PARKING LOT.





SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #54

☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)

NORTHING (Y) = 147287.543
EASTING (X) = 788917.966

MONUMENT DESCRIPTION AND CONDITION

5" REBAR & ALUMINIUM CAP SET 0.1' BELOW THE SURFACE.

LOCATION METHOD

☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE

1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)

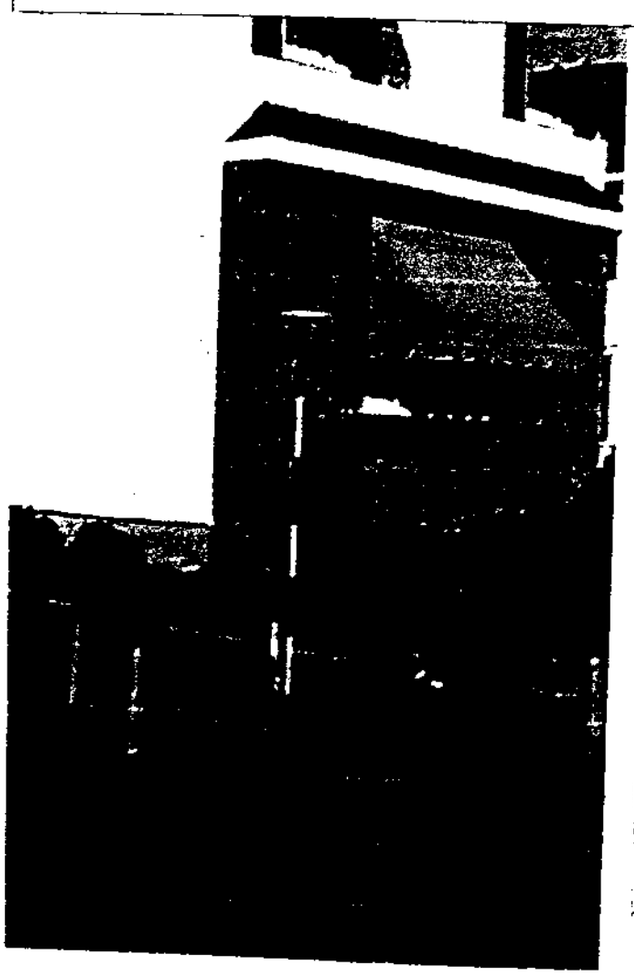
NORTHING (Y) = 483225.882
EASTING (X) = 2588308.360

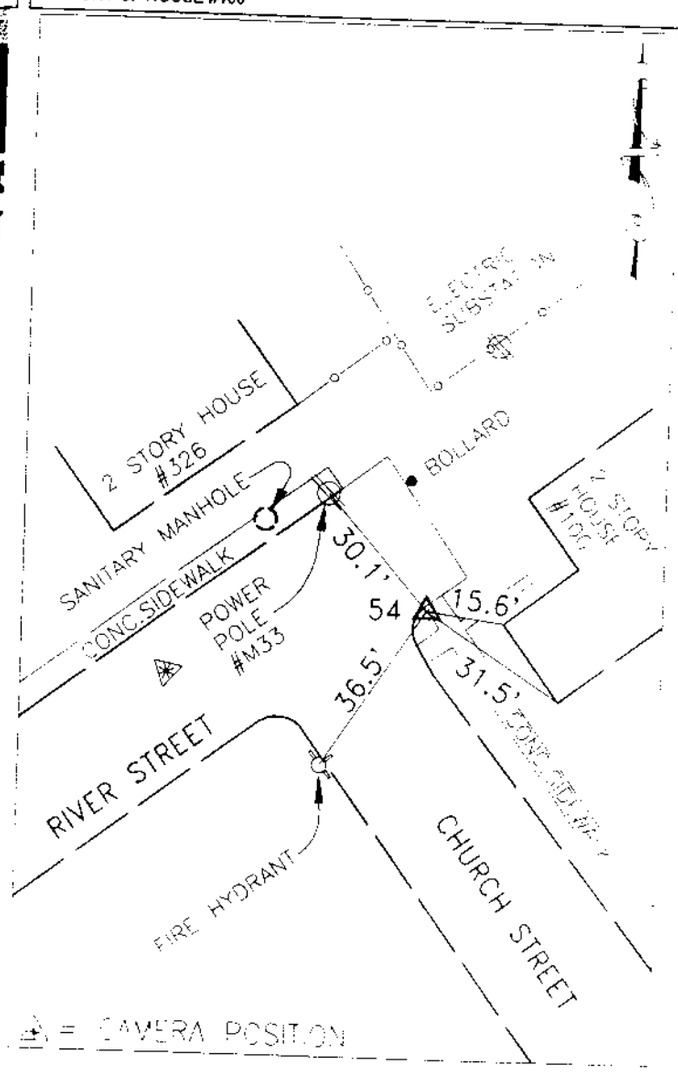
MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929

ELEVATION (FEET) = 766.121
ELEVATION (METERS) = 233.514

TO REACH DESCRIPTION:

FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.E. ON LACKAWANNA AVE. 0.20 MILES TO SUSQUEHANNA AVE. PROCEED N.E. ON SUSQUEHANNA AVE. 0.2 MILES TO CHURCH ST. PROCEED N.W. ON CHURCH ST. TO THE END AT RIVER ST. THE POINT IS ON THE N.E. CORNER OF THIS INTERSECTION AT THE S.W. END OF A CONCRETE SIDEWALK IN FRONT OF HOUSE #100

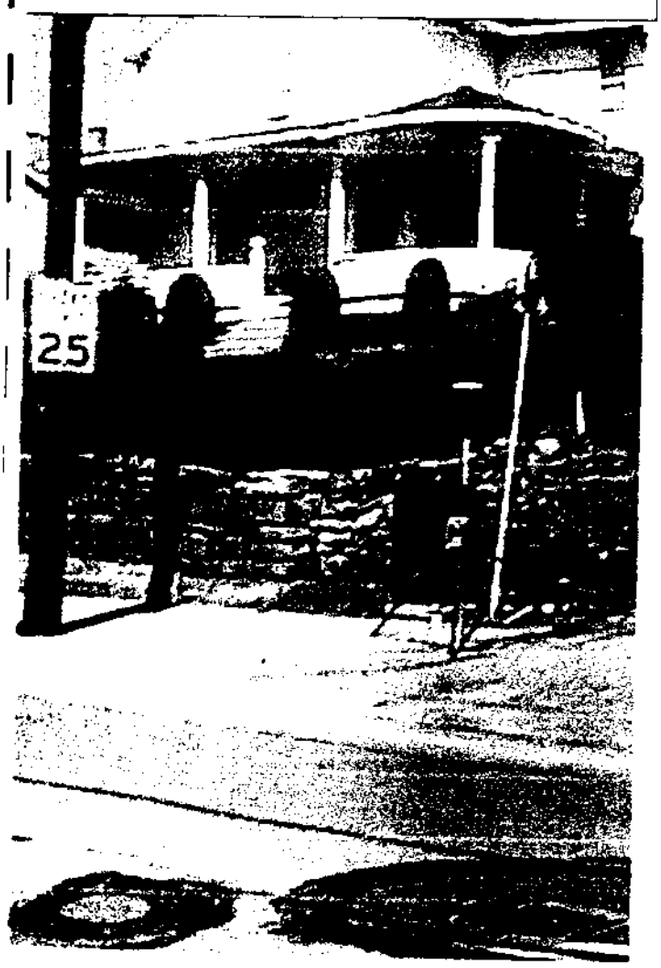


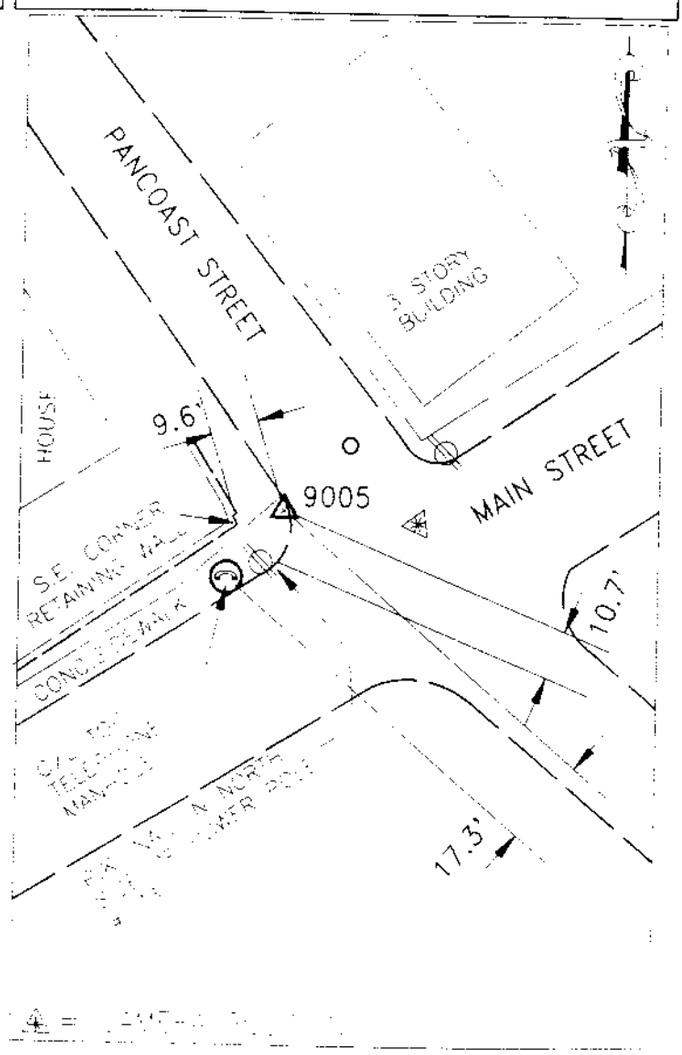


EYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.**, 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

SCRANTON/OLYPHANT GPS SURVEY NETWORK DATA

NAME OF STATION: GA MON #9005 ☐ RECOVERED ☒ ESTABLISHED DATE: JUNE 1997	**LOCATION METHOD** ☒ GPS ☐ EDM TRAVERSE ☐ TRANSIT TAPE TRAVERSE
1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (METERS)	**1927 NORTH AMERICAN DATUM, NORTH ZONE PENNSYLVANIA STATE COORDINATE SYSTEM (FEET)**
NORTHING (Y) = 146619.018 EASTING (X) = 787955.615	NORTHING (Y) = 481032.562 EASTING (X) = 2585151.048
	MEAN SEA LEVEL ELEVATION NATIONAL GEODETIC DATUM OF 1929
	ELEVATION (FEET) = 772.892 ELEVATION (METERS) = 235.578
MONUMENT DESCRIPTION AND CONDITION 36" REBAR & CAP SET IN JOINT BETWEEN THE CONCRETE SIDEWALK & CURB	**TO REACH DESCRIPTION:** FROM THE INTERSECTION OF MAIN ST. & LACKAWANNA AVE. IN DICKSON CITY, PROCEED S.W. ON MAIN ST. 0.5 MILES TO PANCOAST ST. THE POINT IS ON THE WEST CORNER OF THIS INTERSECTION NEAR A STONE RETAINING WALL.





SURVEYED BY: **WILLIAM H. GORDON ASSOCIATES, INC.,** 4501 DALY DRIVE, CHANTILLY, VIRGINIA 20151

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DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.42
         National Geodetic Survey,   Retrieval Date = DECEMBER 12, 1997
LY1330 ***********************************************************************
LY1330  DESIGNATION -  Y 55
LY1330  PID         -  LY1330
LY1330  STATE/COUNTY-  PA/LACKAWANNA
LY1330  USGS QUAD   -  SCRANTON (1977)
LY1330
LY1330                        *CURRENT SURVEY CONTROL
LY1330
LY1330* NAD 83(1986)-  41 24 41.     (N)    075 40 23.     (W)     SCALED
LY1330* NAVD 88     -       225.045  (meters)     738.34   (feet)  ADJUSTED
LY1330
LY1330  GEOID HEIGHT-         -31.39  (meters)                     GEOID96
LY1330  DYNAMIC HT  -         224.958 (meters)     738.05   (feet)  COMP
LY1330  MODELED GRAV-     980,230.5   (mgal)                       NAVD 88
LY1330
LY1330  VERT ORDER  -  SECOND    CLASS 0
LY1330
LY1330.The horizontal coordinates were scaled from a topographic map and have
LY1330.an estimated accuracy of +/- 6 seconds.
LY1330
LY1330.The orthometric height was determined by differential leveling
LY1330.and adjusted by the National Geodetic Survey in June 1991.
LY1330
LY1330.The geoid height was determined by GEOID96.
LY1330
LY1330.The dynamic height is computed by dividing the NAVD 88
LY1330.geopotential number by the normal gravity value computed on the
LY1330.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
LY1330.degrees latitude (G = 980.6199 gals.).
LY1330
LY1330.The modeled gravity was interpolated from observed gravity values.
LY1330
LY1330;                     North         East    Units  Estimated Accuracy
LY1330;SPC PA N     -    140,310.      773,630.     MT  (+/- 180 meters Scaled)
LY1330
LY1330                        SUPERSEDED SURVEY CONTROL
LY1330
LY1330  NGVD 29     -       225.262  (meters)     739.05   (feet)  ADJ UNCH
LY1330
LY1330.Superseded values are not recommended for survey control.
LY1330.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
LY1330.See file format.dat to determine how the superseded data were derived.
LY1330
LY1330_MARKER: DB = BENCH MARK DISK
LY1330_SETTING: 36 = SET IN A MASSIVE STRUCTURE
LY1330_STAMPING: Y 55 1934
LY1330_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
LY1330
LY1330  HISTORY     - Date     Condition        Recov. By
LY1330  HISTORY     - 1934     MONUMENTED       CGS
LY1330  HISTORY     - 1961     GOOD             NGS
LY1330  HISTORY     - 1975     GOOD             PADT
LY1330
LY1330                        STATION DESCRIPTION
LY1330
LY1330'DESCRIBED BY NATIONAL GEODETIC SURVEY 1961
LY1330'AT SCRANTON.
LY1330'AT SCRANTON, LACKAWANNA COUNTY, ON THE ERIE-LACKAWANNA RAILROAD,
LY1330'AT THE 6-SPAN PLATE-GIRDER BRIDGE OVER LACKAWANNA RIVER, IN THE
LY1330'NORTHEAST END OF THE NORTHWEST ABUTMENT, 15 FEET NORTHWEST OF THE
LY1330'CENTERLINE OF SEVENTH STREET, AND ABOUT 6 FEET LOWER THAN THE TOP
LY1330'OF THE RAIL.  A STANDARD DISK, STAMPED Y 55 1934.
LY1330
LY1330                        STATION RECOVERY (1975)
LY1330
LY1330'RECOVERY NOTE BY PA DEPT OF TRANSP 1975
LY1330'RECOVERED IN GOOD CONDITION.
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DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.42
1        National Geodetic Survey,   Retrieval Date = DECEMBER 12, 1997
 LY1586 ***********************************************************************
 LY1586  DESIGNATION -  J 278
 LY1586  PID         -  LY1586
 LY1586  STATE/COUNTY-  PA/LACKAWANNA
 LY1586  USGS QUAD   -  SCRANTON (1977)
 LY1586
 LY1586                          *CURRENT SURVEY CONTROL
 LY1586
 LY1586* NAD 83(1986)-  41 26 53.      (N)    075 38 00.      (W)     SCALED
 LY1586* NAVD 88     -       232.288  (meters)     762.10   (feet)  ADJUSTED
 LY1586
 LY1586  GEOID HEIGHT-         -31.27  (meters)                      GEOID96
 LY1586  DYNAMIC HT  -         232.197 (meters)     761.80   (feet)  COMP
 LY1586  MODELED GRAV-     980,224.6   (mgal)                        NAVD 88
 LY1586
 LY1586  VERT ORDER  -  SECOND    CLASS 0
 LY1586
 LY1586.The horizontal coordinates were scaled from a topographic map and have
 LY1586.an estimated accuracy of +/- 6 seconds.
 LY1586
 LY1586.The orthometric height was determined by differential leveling
 LY1586.and adjusted by the National Geodetic Survey in June 1991.
 LY1586
 LY1586.The geoid height was determined by GEOID96.
 LY1586
 LY1586.The dynamic height is computed by dividing the NAVD 88
 LY1586.geopotential number by the normal gravity value computed on the
 LY1586.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 LY1586.degrees latitude (G = 980.6199 gals.).
 LY1586
 LY1586.The modeled gravity was interpolated from observed gravity values.
 LY1586
 LY1586;                      North         East    Units  Estimated Accuracy
 LY1586;SPC PA N     -    144,460.      776,850.      MT  (+/- 180 meters Scaled)
 LY1586
 LY1586                          SUPERSEDED SURVEY CONTROL
 LY1586
 LY1586  NGVD 29     -        232.506  (meters)     762.81   (feet)  ADJ UNCH
 LY1586
 LY1586.Superseded values are not recommended for survey control.
 LY1586.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 LY1586.See file format.dat to determine how the superseded data were derived.
 LY1586
 LY1586_MARKER: DD = SURVEY DISK
 LY1586_SETTING: 36 = SET IN A MASSIVE STRUCTURE
 LY1586_STAMPING: J 278 1961
 LY1586_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 LY1586
 LY1586  HISTORY     - Date     Condition        Recov. By
 LY1586  HISTORY     - 1961     MONUMENTED       PADH
 LY1586  HISTORY     - 1961     GOOD             NGS
 LY1586  HISTORY     - 19941230 MARK NOT FOUND   USGS
 LY1586
 LY1586                          STATION DESCRIPTION
 LY1586
 LY1586'DESCRIBED BY NATIONAL GEODETIC SURVEY 1961
 LY1586'0.3 MI S FROM DICKSON CITY.
 LY1586'0.3 MILE SOUTH ALONG SCRANTON BY-PASS FROM THE OVERPASS OVER MAIN
 LY1586'ST. IN DICKSON CITY, SET IN SOUTH EAST END OF WINGWALL FOR
 LY1586'OVERPASS OVER BOULEVARD AVE, 39 FEET NORTH EAST OF THE MEDIAN
 LY1586'STRIP FOR BRIDGES, IN BRIDGE FOR NORTH BOUND LANE, PENNSYLVANIA
 LY1586'DEPARTMENT OF HIGHWAYS DISK DRILLED IN HORIZONTAL, STAMPED
 LY1586'J 278 1961.
 LY1586
 LY1586                          STATION RECOVERY (1994)
 LY1586
 LY1586'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1994 (DH)
 LY1586'MARK NOT FOUND.
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DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.42
1        National Geodetic Survey,   Retrieval Date = DECEMBER 13, 1997
 LY1703 ***********************************************************************
 LY1703  DESIGNATION -  CHARITY
  '1703  PID         -  LY1703
   1703  STATE/COUNTY-  PA/LACKAWANNA
 LY1703  USGS QUAD   -  DALTON (1971)
 LY1703
 LY1703                          *CURRENT SURVEY CONTROL
 LY1703  ____________________________________________________________________
 LY1703* NAD 83(1986)-  41 30 03.46495(N)    075 41 05.92802(W)     ADJUSTED
 LY1703* NAVD 88     -       444.896  (meters)    1459.63   (feet)  ADJUSTED
 LY1703  ____________________________________________________________________
 LY1703  LAPLACE CORR-           2.77  (seconds)                    DEFLEC96
 LY1703  GEOID HEIGHT-         -31.16  (meters)                     GEOID96
 LY1703  DYNAMIC HT  -         444.722 (meters)    1459.06   (feet)  COMP
 LY1703  MODELED GRAV-     980,217.7   (mgal)                       NAVD 88
 LY1703
 LY1703  HORZ ORDER  -  SECOND
 LY1703  VERT ORDER  -  SECOND    CLASS 0
 LY1703
 LY1703.The horizontal coordinates were established by classical geodetic methods
 LY1703.and adjusted by the National Geodetic Survey in July 1986.
 LY1703
 LY1703.The orthometric height was determined by differential leveling
 LY1703.and adjusted by the National Geodetic Survey in June 1991.
 LY1703
 LY1703.The Laplace correction was computed from DEFLEC96 derived deflections.
 LY1703
 LY1703.The geoid height was determined by GEOID96.
 LY1703
 LY1703.The dynamic height is computed by dividing the NAVD 88
 LY1703.geopotential number by the normal gravity value computed on the
 LY1703.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 LY1703.degrees latitude (G = 980.6199 gals.).
  '1703
  .1703.The modeled gravity was interpolated from observed gravity values.
 LY1703
 LY1703;                    North          East      Units   Scale      Converg.
 LY1703;SPC PA N     -   150,234.326   772,395.111   MT  0.99995790 +1 21 57.9
 LY1703;UTM  18      - 4,594,597.528   442,830.349   MT  0.99964022 -0 27 14.0
 LY1703
 LY1703:                Primary Azimuth Mark                      Grid Az
 LY1703:SPC PA N     -  ADELLA                                    037 02 26.4
 LY1703:UTM  18      -  ADELLA                                    038 51 38.3
 LY1703
 LY1703|-------------------------------------------------------------------|
 LY1703| PID    Reference Object                     Distance      Geod. Az  |
 LY1703|                                                           dddmmss.s |
 LY1703| LY2792 ADELLA                             APPROX. 3.3 KM 0382424.3 |
 LY1703| LY1702 CHARITY RM 1                         6.758 METERS 13304     |
 LY1703| LY2734 SCRANTON TV STA WDAU S MAST        APPROX. 9.8 KM 2121813.2 |
 LY1703| LY1704 CHARITY RM 2                         6.876 METERS 30115     |
 LY1703|-------------------------------------------------------------------|
 LY1703
 LY1703                          SUPERSEDED SURVEY CONTROL
 LY1703
 LY1703  NAD 27      -  41 30 03.18680(N)    075 41 07.23950(W)     ADJUSTED
 LY1703  NGVD 29     -       445.109  (meters)    1460.33   (feet)  ADJ UNCH
 LY1703
 LY1703.Superseded values are not recommended for survey control.
 LY1703.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 LY1703.See file format.dat to determine how the superseded data were derived.
 LY1703
 LY1703_MARKER: DS = TRIANGULATION STATION DISK
 LY1703_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT (ROUND)
  '1703_STAMPING: CHARITY 1959
  .1703_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 LY1703+STABILITY: SURFACE MOTION
 LY1703
 LY1703  HISTORY     - Date     Condition        Recov. By
 LY1703  HISTORY     - 1959     MONUMENTED       CGS
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LY1703  HISTORY     - 1961     GOOD            NGS
LY1703  HISTORY     - 1974     GOOD            NGS
LY1703  HISTORY     - 1974     GOOD            NGS
LY1703
LY1703                          STATION DESCRIPTION
LY1703
LY1703'DESCRIBED BY COAST AND GEODETIC SURVEY 1959 (CGS)
LY1703'THE STATION IS LOCATED ABOUT 1/2 MILE EAST OF CLARKS GREEN, ABOUT 2
LY1703'MILES SOUTHEAST OF WAVERLY, ABOUT 450 FEET NORTHWEST OF THE
LY1703'LOURDESMONT SCHOOL, IN A NORTH AND SOUTH FENCE LINE, ON THE SOUTH
LY1703'SLOPE OF A LOW HILL AND IS ON THE LOURDESMONT SCHOOL GROUND.
LY1703'
LY1703'TO REACH THE STATION FROM THE JUNCTION OF U.S. HIGHWAY 11 AND STATE
LY1703'HIGHWAY 407, IN THE SOUTHEAST EDGE OF CLARKS SUMMIT, GO NORTHEAST ON
LY1703'HIGHWAY 407 FOR 0.43 MILE TO AN INTERSECTION, THE ABINGTON ROAD AND
LY1703'STATE HIGHWAY 407.  TURN RIGHT AND GO SOUTH ON THE ABINGTON ROAD
LY1703'FOR 0.1 MILE TO THE INTERSECTION COUNTY HIGHWAY 35054 AND VENARD ROAD
LY1703'WITH THE ABINGTON ROAD.  TURN LEFT AND GO EAST ON COUNTY HIGHWAY
LY1703'35054 AND VENARD ROAD FOR 0.56 MILE TO THE ENTRANCE TO THE
LY1703'LOURDESMONT SCHOOL ON THE LEFT.  TURN LEFT AND GO NORTH ON THE
LY1703'SCHOOL DRIVEWAY FOR 0.17 MILE TO A FORK.  TAKE THE RIGHT FORK AND GO
LY1703'NORTH AND WEST ON THE DRIVEWAY AROUND THE EAST AND NORTH SIDE OF THE
LY1703'SCHOOL BUILDING FOR 0.14 MILE TO A SMALL SQUARE BRICK BUILDING,
LY1703'THE END OF PAVEMENT AND THE END OF TRUCK TRAVEL.  FROM THE END OF
LY1703'TRUCK TRAVEL PACK SOUTH-SOUTHWEST FOR ABOUT 300 FEET TO THE FENCE
LY1703'ROW AND STATION AS DESCRIBED.  IN DRY WEATHER THE LAST 300 FEET MAY
LY1703'BE DRIVEN.
LY1703'
LY1703'THE STATION MARK, A STANDARD DISK STAMPED CHARITY 1959, IS SET IN THE
LY1703'TOP OF A SQUARE CONCRETE MONUMENT WHICH IS FLUSH WITH THE SURFACE
LY1703'OF THE GROUND.  IT IS 7.1 FEET EAST OF A STANDARD METAL WITNESS POST
LY1703'AND IS SET IN A FENCE ROW.
LY1703'
LY1703'REFERENCE MARK 1, A STANDARD DISK STAMPED CHARITY NO 1 1959, IS SET
LY1703'IN THE TOP OF A SQUARE CONCRETE MONUMENT WHICH IS FLUSH WITH THE
LY1703'SURFACE OF THE GROUND.  IT IS 19 FEET SOUTH OF A STANDARD METAL
LY1703'WITNESS POST, ABOUT 2 FEET LOWER THAN THE STATION AND IS SET IN A
LY1703'FENCE ROW.
LY1703'
LY1703'REFERENCE MARK 2, A STANDARD DISK STAMPED CHARITY NO 2 1959, IS SET
LY1703'IN THE TOP OF A SQUARE CONCRETE MONUMENT WHICH IS FLUSH WITH THE
LY1703'SURFACE OF THE GROUND.  IT IS 28.1 FEET NORTHEAST OF A STANDARD METAL
LY1703'WITNESS POST, 2 FEET HIGHER THAN THE STATION AND IS SET IN A FENCE
LY1703'ROW.
LY1703'
LY1703'AN AZIMUTH MARK WAS NOT ESTABLISHED FOR THIS STATION.  TRIANGULATION
LY1703'STATION ADELLA OR THE WDAU T.V. SOUTH MAST MAY BE USED AS AN
LY1703'AZIMUTH MARK.
LY1703'
LY1703'HEIGHT OF LIGHT ABOVE STATION MARK 1 METERS.
LY1703
LY1703                          STATION RECOVERY (1961)
LY1703
LY1703'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1961
LY1703'IN CLARKS GREEN.
LY1703'ABOUT 0.1 MILE SOUTH ALONG ABINGTON RD. FROM THE JUNCTION OF
LY1703'ABINGTON RD. AND STATE HWY 407 IN CLARKS GREEN TO THE INTERSECTION
LY1703'OF ABINGTON RD. AND VENARD RD. (COUNTY RD. 35054) THENCE EAST
LY1703'ON VENARD RD. FOR 0.56 MILE TO ENTRANCE TO LOURDESMONT SCHOOL
LY1703'THENCE 0.17 MILE NORTH ON ENTRANCE ROAD TO A FORK RIGHT, GO NORTH
LY1703'AND WEST ON ROAD AROUND THE EAST AND NORTH SIDE OF SCHOOL
LY1703'BUILDING FOR 0.14 MILE TO A SMALL BRICK BUILDING (END OF TRUCK
LY1703'TRAVEL) THENCE ABOUT 300 FEET SOUTH-SOUTH WEST TO A FENCE ROW,
LY1703'STANDARD TRIANGULATION STATION DISK SET IN TOP OF CONCRETE POST,
LY1703'ABOUT FLUSH WITH THE GROUND, 7 FEET EAST OF STANDARD METAL WITNESS
LY1703'POST, STAMPED CHARITY 1959.  ABOUT 22 1/2 FEET EAST-SOUTH EAST
LY1703'OF RM 2, 22 FEET NORTH WEST OF RM 1.
LY1703
LY1703                          STATION RECOVERY (1974)
LY1703
LY1703'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1974 (CLN)
LY1703'THE STATION AND ALL MARKS WERE RECOVERED AND FOUND IN GOOD CONDITION.
LY1703'THERE WAS A DAMAGE REPORT ON THIS STATION, HOWEVER ALL MARKS
LY1703'WERE RECOVERED AS DESCRIBED IN THE 1959 DESCRIPTION.
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LY1703'
LY1703'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 1/2 MILE EAST OF
LY1703'CLARKS GREENE.
LY1703
LY1703                          STATION RECOVERY (1974)
LY1703
  1703'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1974
LY1703'RECOVERED IN GOOD CONDITION.
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DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.42
1        National Geodetic Survey,   Retrieval Date = DECEMBER 13, 1997
LY2768 ***********************************************************************
LY2768  DESIGNATION -  WILKES BARRE
LY2768  PID         -  LY2768
LY2768  STATE/COUNTY-  PA/LUZERNE
LY2768  USGS QUAD   -  PITTSTON (1983)
LY2768
LY2768                         *CURRENT SURVEY CONTROL
LY2768
LY2768* NAD 83(1986)-  41 15 05.22340(N)    075 52 24.96258(W)     ADJUSTED
LY2768* NAVD 88     -       207.     (meters)     679.     (feet)  SCALED
LY2768
LY2768  LAPLACE CORR-           1.90  (seconds)                    DEFLEC96
LY2768  GEOID HEIGHT-         -31.91  (meters)                     GEOID96
LY2768
LY2768  HORZ ORDER  -  FIRST
LY2768
LY2768.The horizontal coordinates were established by classical geodetic methods
LY2768.and adjusted by the National Geodetic Survey in July 1986.
LY2768
LY2768.The orthometric height was scaled from a topographic map.
LY2768
LY2768.The Laplace correction was computed from DEFLEC96 derived deflections.
LY2768
LY2768.The geoid height was determined by GEOID96.
LY2768
LY2768;                    North         East     Units   Scale      Converg.
LY2768;SPC PA N     -   122,172.645   757,251.268   MT  0.99996102 +1 14 28.7
LY2768;UTM  18      - 4,567,039.043   426,808.396   MT  0.99966593 -0 34 33.8
LY2768
LY2768:                Primary Azimuth Mark                      Grid Az
LY2768:SPC PA N     -  SMOKE                                     145 24 21.5
LY2768:UTM  18      -  SMOKE                                     147 13 24.0
LY2768
LY2768|-----------------------------------------------------------------------|
LY2768| PID    Reference Object                      Distance      Geod. Az  |
LY2768|                                                            dddmmss.s |
LY2768| LY2770 WILKES BARRE MUSKIN MFG TANK        305.226 METERS 05441     |
LY2768|        WILKES BARRE RM 1                    27.230 METERS 06933     |
LY2768|        WILKES BARRE RM 2                     7.060 METERS 10626     |
LY2768| LY1420 SMOKE                              APPROX. 2.9 KM 1463850.2 |
LY2768|        WILKES BARRE RM 3                     7.270 METERS 18833     |
LY2768|        WILKES BARRE AZ MK                                 3353309.7 |
LY2768|-----------------------------------------------------------------------|
LY2768
LY2768                          SUPERSEDED SURVEY CONTROL
LY2768
LY2768  NAD 27      -  41 15 04.92900(N)    075 52 26.25900(W)     ADJUSTED
LY2768
LY2768.Superseded values are not recommended for survey control.
LY2768.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
LY2768.See file format.dat to determine how the superseded data were derived.
LY2768
LY2768  HISTORY     - Date     Condition        Recov. By
LY2768  HISTORY     - 1934     MONUMENTED       CGS
LY2768  HISTORY     - 1947     POOR             CGS
LY2768  HISTORY     - 1958     POOR             CGS
LY2768  HISTORY     - 1959     POOR             CGS
LY2768  HISTORY     - 1969     POOR             CGS
LY2768
LY2768                          STATION DESCRIPTION
LY2768
LY2768'DESCRIBED BY COAST AND GEODETIC SURVEY 1934 (JB)
LY2768'THIS SECOND-ORDER STATION IS LOCATED IN THE CITY OF WILKES-BARRE, ON
LY2768'THE PROPERTY OF THE WILKES-BARRE LACE CO, ABOUT 1/4 MILE SE OF
LY2768'THE SUSQUEHANNA RIVER.  IT IS ON THE TOP OF A HOG BACK RIDGE ABOUT
LY2768'1/4 MILE IN LENGTH (NE AND SW) AND ABOUT 60 FEET ACROSS TOP.  IT
LY2768'IS ABOUT 40 METERS (131 FEET) S OF THE SW END OF COURT STREET (A
LY2768'CINDER-PAVED ALLEY), 27 FEET SE OF NW EDGE OF RIDGE AND 28 FEET NW
LY2768'OF A ROCK LEDGE ON THE SE EDGE OF RIDGE AND 100 FEET NE OF A SADDLE.
LY2768'IT IS 87 FEET S OF THE SW CORNER OF A FRAME HOUSE AND 103 FEET SSW
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LY2768'OF THE SW CORNER OF ANOTHER FRAME HOUSE. THE STATION MARK PROJECTS
LY2768'2 INCHES.
LY2768'
LY2768'REFERENCE MARK NO. 1 IS 27.231 METERS E BY N OF STATION, A STANDARD
LY2768'BRONZE DISK SET IN A DRILL HOLE IN OUTCROPPING ROCK LEDGE ON SE EDGE
LY2768'OF RIDGE, 2 FEET W OF OUTER RIM.
LY2768'
LY2768'REFERENCE MARK NO. 2 IS 7.060 METERS SSW OF STATION, A STANDARD
LY2768'BRONZE DISK SET IN A DRILL HOLE IN OUTCROPPING ROCK LEDGE ON SE
LY2768'EDGE OF RIDGE, 2 FEET W OF OUTER RIM.
LY2768'
LY2768'AZIMUTH MARK IS 1/2 MILE NW OF STATION, ACROSS THE RIVER, IN THE TOWN
LY2768'OF KINGSTON. IT IS A STANDARD BRONZE DISK SET IN A DRILL HOLE IN
LY2768'THE NE SIDEWALK OF HARDING STREET, 21 FEET NE OF CENTER LINE OF
LY2768'HARDING STREET, 240 FEET NW OF INTERSECTION OF HARDING
LY2768'STREET AND THIRD AVENUE AND 120 FEET SE OF THE TOE OF THE
LY2768'PENNSYLVANIA RAILROAD FILL.
LY2768'
LY2768'TO REACH STATION FROM COURTHOUSE IN WILKES-BARRE, GO N ON NORTH RIVER
LY2768'STREET 0.4 MILE TO COURTWRIGHT AVENUE, TURN RIGHT ON COURTWRIGHT
LY2768'AVENUE AND GO 0.2 MILE TO WILKES-BARRE LACE COMPANY FACTORY AND COURT
LY2768'STREET (A CINDER-PAVED ALLEY). TURN RIGHT ON COURT STREET AND GO
LY2768'0.2 MILE TO END. HERE TAKE FOOT PATH AND GO S 40 METERS (131 FEET)
LY2768'TO TOP OF RIDGE AND STATION.
LY2768'
LY2768'A 4-FOOT STAND USED AND CLEARED ALL LINES.
LY2768
LY2768 STATION RECOVERY (1947)
LY2768
LY2768'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1947 (WJP)
LY2768'STATION MARK IS IN POOR CONDITION. DISK HAS BEEN CHISELED AWAY,
LY2768'PORTION OF SHANK REMAINING.
LY2768'
LY2768'R.M. 1 WAS NOT FOUND. R.M. 2 REMOVED. HOLE IN ROCK FOUND WHERE DISK
LY2768'HAD BEEN.
LY2768'
LY2768'FROM DESCRIPTION OF STATION, DELETE THE FOLLOWING- AND 103 FEET SSW
LY2768'OF THE SW CORNER OF ANOTHER FRAME HOUSE. (HOUSE HAS BEEN REMOVED.)
LY2768
LY2768 STATION RECOVERY (1958)
LY2768
LY2768'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1958 (JMR)
LY2768'THE MONUMENT WITH THE STEM AND WHAT APPEARED TO BE THE HOLE IN THE
LY2768'CENTER OF THE STATION MARK DISK WAS RECOVERED. REFERENCE MARK
LY2768'1 WAS RECOVERED AS DESCRIBED. REFERENCE MARK 2 WAS SEARCHED FOR BUT
LY2768'NOT FOUND. THE AZIMUTH MARK WAS NOT SEARCHED FOR AT THIS TIME.
LY2768
LY2768 STATION RECOVERY (1959)
LY2768
LY2768'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1959 (CGS)
LY2768'STATION MARK AND REFERENCE MARK 1 WERE RECOVERED AND FOUND IN GOOD
LY2768'CONDITION. THE AZIMUTH MARK AND REFERENCE MARK 2 WERE DESTROYED.
LY2768'AZIMUTH MARK DUE TO STREET CONSTRUCTION AND REFERENCE MARK 2 DUE TO
LY2768'VANDALISM. REFERENCE MARK 3 WAS SET FOR THE STATION. A NEW
LY2768'AZIMUTH MARK WAS NOT SET FOR THE STATION BECAUSE THERE ARE
LY2768'TRIANGULATION AND INTERSECTION STATIONS VISIBLE FROM THE STATION
LY2768'MARK. OBSERVATION AND MEASUREMENT CHECKS WERE MADE ON REFERENCE MARK
LY2768'1 AND ON ALL 1934 INTERSECTION OBJECTS. AN ERROR WAS NOTED IN
LY2768'THE ANGLE TO THE WILKES BARRE, LACE COMPANY, WATER TANK WHICH IS NOW
LY2768'KNOWN AS THE WILKES BARRE, MUSKIN MANUFACTURING COMPANY, WATER TANK
LY2768'DUE TO THE NEW OWNERSHIP. THE 1934 DESCRIPTION OF HOW TO REACH THE
LY2768'STATION IS ADEQUATE. MR. JOSEPH VANKEVICH IS NOW THE OWNER OF THE
LY2768'PROPERTY ON WHICH THE STATION IS ESTABLISHED.
LY2768
LY2768 STATION RECOVERY (1969)
LY2768
LY2768'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1969 (WMJ)
LY2768'STATION MARK AND REFERENCE MARK NUMBER 1 WERE RECOVERED AS WAS
LY2768'DESCRIBED IN THE 1958 RECOVERY NOTE AND ARE IN GOOD CONDITION.
LY2768'REFERENCE MARK NUMBER 3 DISK HAS BEEN BROKEN OFF BUT THE DISK STEM IS
LY2768'STILL IN THE DRILL HOLE. CENTER OF THE STEM WAS USED AS CENTER
LY2768'POINT FOR DISTANCE AND HORIZONTAL CHECK AND BOTH CHECKED ADEQUATELY.
LY2768'
LY2768'STATION IS ON A LOW RIDGE WHICH MEASURES ABOUT 1/4 MILE IN LENGTH AND

LY2768'60 FEET WIDE. RIDGE LIES BETWEEN COURT AND MAIN STREETS,
LY2768'COURTWRIGHT AVENUE AND WEST NORTH STREET.
LY2768'
LY2768'STATION MARK IS 205 FEET NORTHEAST OF THE EAST CORNER OF A FENCE
LY2768'WHICH SURROUNDS THE SAINT NICKS CEMETERY AND 87 FEET SOUTH OF THE
LY2768'SOUTHWEST CORNER OF A FRAME HOUSE.
2768'
LY2768'STAION IS REACHED FROM THE EAST CORNER OF THE LUZERNE COUNTY
LY2768'COURTHOUSE GROUNDS (NORTH RIVER-WEST NORTH STREETS
LY2768'INTERSECTION). GO NORTHEAST ON NORTH RIVER STREET FOR 0.4 MILE TO
LY2768'COURTWRIGHT AVENUE. TURN RIGHT AND PROCEED ON COURTWRIGHT
LY2768'AVENUE FOR 0.15 MILE TO COURT STREET AND THE MUSKIN MANUFACTURING
LY2768'COMPANY BUILDING ON THE RIGHT. TURN RIGHT AND GO SOUTHWEST ON
LY2768'COURT STREET FOR 0.2 MILE TO THE END OF THE STREET. PACK SOUTH,
LY2768'UPHILL FOR ABOUT 130 FEET TO TOP OF RIDGE AND STATION.
LY2768'
LY2768'A MEASUREMENT BETWEEN THE REFERENCE MARKS COULD NOT BE OBTAINED DUE
LY2768'TO TIMBER OBSTRUCTION.
LY2768'
LY2768'THE JOE ENGLES TANK WHICH IS MENTIONED ABOVE WAS FORMERLY OWNED BY
LY2768'THE CONTINENTAL CAN COMPANY AND IS NOW OWNED BY JOE ENGLES.
LY2768'
LY2768'THIS TRIANGULATION STATION IS NOT TO BE CONFUSED WITH THE U.S. COAST
LY2768'AND GEODETIC SURVEY BENCH MARK, WILKES BARRE 1934 WHICH IS LOCATED
LY2768'IN THE SQUARE IN THE BUSINESS SECTION OF WILKES BARRE.
LY2768'
LY2768'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN- IN WILKES BARRE.

LOGS OF SUBSURFACE EXPLORATIONS
&
LABORATORY TESTING RESULTS

LACKAWANNA RIVER LFPP
OLYPHANT, PA
SUBSURFACE EXPLORATION NOTES

1. EXPLORATION WAS PERFORMED DURING MAY-JUNE 1989, NOVEMBER 1993, APRIL-MAY 1994 AND MAY-JUNE 1995.

2. ALL DRILL HOLES WERE ACCOMPLISHED BY STANDARD PENETRATION TEST PROCEDURE (SPT) USING A 1-3/8" X 2'-8" LONG SPLIT SPOON, EXCEPT FOR DH-44 AND DH-45 WHICH WERE ACCOMPLISHED WITH A COMBINATION OF 1-3/8" AND 3" DIA. SPLIT SPOON. SAMPLE SPOONS WERE ADVANCED BY A 140 # HAMMER FALLING 30". THESE HOLES WERE POWER AUGERED BETWEEN SAMPLES UNLESS OTHERWISE INDICATED. THE FIRST BLOW COUNT IN A GIVEN LENGTH OF DRIVE IS FOR 0.5'; THE SECOND BLOW COUNT IS FOR 1.0', UNLESS OTHERWISE INDICATED.

   L.O.D. - LENGTH OF DRIVE

   P - DENOTES PRESSED SHELBY TUBE SAMPLE

   ROCK WAS CORED WITH AN NQ SERIES CORE BIT.

3. BLOW COUNTS REQUIRED TO ADVANCE SAMPLE ARE SHOWN IN COLUMN (a), EXCEPT PERCENT CORE RECOVERY WHICH IS INDICATED WHERE ROCK WAS CORED.

4. THE ROCK COLORS WITH LETTER/NUMBER DESIGNATION ARE IN ACCORDANCE WITH THE "ROCK COLOR CHART" DISTRIBUTED BY THE GEOLOGICAL SOCIETY OF AMERICA. THESE COLORS GIVEN ARE WHEN CORE IS WET.

5. COLUMN (b) SHOWS THE NATURAL WATER CONTENTS IN PER CENT OF DRY WEIGHT OF THOSE SAMPLES TESTED AND PERCENT RQD WHERE ROCK WAS CORED. RQD IS CALCULATED AS NQ SIZE CORE PIECES GREATER THAN OR EQUAL TO 4" PER RUN AS DRILLED.

6. SOIL DESCRIPTIONS ARE SHOWN IN COLUMN (c).

7. SOIL DESCRIPTIONS ARE LABORATORY CLASSIFICATIONS BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM (MIL-STD-619B) OR (ASTM D2487), EXCEPT THOSE INDICATED THUS (**), WHICH ARE FIELD INSPECTOR'S CLASSIFICATIONS.

   ROCK CORE LOGGING ARE BASED ON GUIDELINES PROVIDED BY HQ-USACE, AEG(S. AFRICA SECTION), AND SUPPLEMENTAL CRITERIA PROVIDED BY USACE - BALTIMORE DISTRICT.

7a. BORINGS DH-201A AND DH-202A WERE SCREENED WITH A PHOTOIONIZATION DETECTOR (PID). UNLESS OTHERWISE INDICATED, NO MEASUREABLE READINGS ABOVE BACKGROUND WERE OBTAINED IN THE FIELD.

8. GROUNDWATER DEPTHS ARE INDICATED ON THE LOGS AS ▽, ▼ & ▼ AND ARE SHOWN IN COLUMN (d). PERTINENT DATA FOR THESE READINGS ARE SHOWN IN THE LOWER LEFT HAND COLUMN UNDER GROUNDWATER DATA. THE ACTUAL GROUNDWATER LEVEL MAY VARY DEPENDING UPON SEASONS AND AMOUNT OF RAINFALL.

9. ELEVATIONS SHOWN ON THE BORING LOGS ARE GROUND SURFACE ELEVATIONS AT THE TIME OF EXPLORATION. THEY WERE DETERMINED BY ESTIMATION FROM CONTOUR MAPS; DESIGNATED (±).

10. FOR LOCATIONS OF SUBSURFACE EXPLORATIONS SEE PLATES D-3-1 THRU D-3-4.

STA.	Lackawanna River LFPP - Olyphant	N	**DH-301**
OFFSET:	Olyphant, PA	E	1 of 1
TOP ELEV:	Levee Design	COMPLETED: May 3, 1995	

DEPTH (ft)	(c)	(d)	(a)	(b)
	Moist very dark brown silty SAND w/ gravel and tr. of paper (0.0-1.5), tr. of coal (1.5-3.0) (SM)		3-7-16	
3.0			12-28-40	
4.2	Moist very dark gray clayey silty GRAVEL w/ sand (GM)		48-100	
5.9	Moist very dark grayish brown well-graded SAND w/ silt and gravel (SW-SM)	5	7-15-100/.4	4.1
7.5	Moist very dark gray brown silty gravel w/ sand and rock fragments (GM)		28-2-31	
	Moist black to dark brown well-graded SAND w/ silt and gravel (SW-SM) w/ thin bands of fine coal		8-15-23	
		10	5-15-15	
12.0	Moist brown silty SAND (SM)		10-14-15	7.7
14.5	Moist dark yellowish brown silty SAND w/ gravel (SM)	15	6-26-24	12.7
17.0	Moist brown & very dark brown to dark yellowish brown silty SAND w/ gravel and rock fragments (SM) w/ wood pieces & mica		37-100/.2	
		20	17-19-45	
22.0	Moist gray & dark yellow brown silty GRAVEL w/ sand and rock fragments (GM)		26-86-57	
24.5	Damp dark gray brown sandy GRAVEL (GP) w/ rock & glass fragments	25	31-52-78	
26.5	Bottom of Hole			
		30		
		35		

DH-301
GROUND WATER DATA
▽ WHILE DRILLING: NE
▼ ON COMPLETION: NE
▼ 24 Hr. READING: NT

Fill Auger SPT RB Cored

GEO-2 05BLL 5/3/96 14:11

STA.	Lackawanna River LFPP - Olyphant	N	**DH-302**
OFFSET:	Olyphant, PA	E	1 of 1
TOP ELEV:	Levee Design	COMPLETED: May 3, 1995	

DEPTH (ft)	(c)	(d)	(a)	(b)
1.5	Moist black silty SAND w/ gravel (SM) w/coal		8-11-12	
3.0	Moist yellow brown & black silty SAND w/ tr. of gravel and some coal fragments (SM)		20-24-32	
4.5	Moist dark yellowish brown silty clayey SAND w/ gravel (SC-SM) w/ rock fragments		10-13-30	10
6.0	Damp dark grayish brown silty SAND w/ gravel (SM) w/ coal & rock fragments		31-41-52	
7.5	Moist black & dark yellow brown organic silty SAND w/ gravel (SM) w/ decayed wood		17-15-13	13.6
9.0	L.O.I. = 13.7% - Organic		8-12-12	
10.5	Moist dark brown silty SAND (SM) w/ thin bands of fine coal		7-10-8	
	No Recovery		6-10-13	
12.3	Moist dark brown silty SAND w/ gravel & tr. of decayed wood (SM)			
14.5	Moist very dark grayish brown silty GRAVEL w/ sand (GM) w/ large rock fragments (boulders)	▼	17-40-66	
17.0	Moist dark gray & black clayey silty SAND w/ gravel (SM)		3-13-26	
19.5	Moist dark yellowish brown silty gravel w/ sand (GM) w/ mica		13-40-64	
21.5	Dry gray silty GRAVEL w/ sand (GP-GM) w/ large rock fragments		43-69-52	
	Bottom of Hole			

5 10 15 20 25 30 35

DH-302
GROUND WATER DATA
▽ WHILE DRILLING: NE
▼ ON COMPLETION: NE
▼ 24 Hr. READING: 13.42

Fill Auger SPT RB Cored

GEO-2 05BLL 5/3/96 14:11

STA.	Lackawanna River LFPP - Olyphant	N	**DH-303**
OFFSET:	Olyphant, PA	E	1 of 1
TOP ELEV:	Levee Design	COMPLETED: May 3, 1995	

DEPTH (ft)	(c)	(d)	(a)	(b)
	Moist black to dark grayish brown silty SAND w/ gravel (SM) w/ coal, ash and wood fill (0.0-1.5)	▼	2-4-21	
			54-46-24	
3.0				
	Moist dark grayish brown silty clayey SAND w/ gravel (SC-SM)		18-28-35	8.5
4.5				
	Moist dark brown to dark gray brown & black silty SAND w/ gravel and tr. of coal (6.0-7.5) (SM) w/ rock fragments		21-63-100	
			7-24-35	11.6
7.5				
	Dry dark gray silty GRAVEL w/ sand (GM) w/ rock fragments & boulders		68-85-72	
9.5				
	Moist grayish brown clayey silty SAND w/ gravel (SM) w/mica		13-22-21	
11.5				
	Bottom of Hole			

5, 10, 15, 20, 25, 30, 35

DH-303
GROUND WATER DATA
▽ WHILE DRILLING: NE
▽ ON COMPLETION: NE
▼ 24 Hr. READING: 1.6

Fill Auger SPT RB Cored

GEO-2 05BLL 5/3/96 14:12

STA.	Lackawanna River LFPP - Olyphant	N	**DH-304**
OFFSET:	Olyphant, PA	E	1 of 1
TOP ELEV:	Levee Design	COMPLETED: May 4, 1995	

DEPTH (ft)	(c)	(d)	(a)	(b)
1.5	Damp black silty SAND w/ gravel (w/2 large gravels)		13-22-24	
3.0	Moist dark gray & black silty SAND w/ rock fragments (SM) w/ coal & ash		14-25-100	
4.5	Moist very dark yellowish brown silty SAND w/ tr. gravel (SM) w/ coal pieces		27-78-47	
7.5	Moist dark gray brown & dark yellow brown to dark gray clayey SAND w/ tr. of gravel & mica (SC) w/ mica		21-24-20	15.3
			14-24-25	
9.5	Moist dark gray silty SAND w/ gravel and tr. of coal (SM) w/ mica		9-15-30	
12.0	Moist dark grayish brown micaceous silty SAND w/ tr. of gravel & 3 large gravels (SM)		14-11-80	
14.5	Moist gray silty SAND w/ gravel w/ 3 large gravels (SM) w/ mica		14-41-64	
17.0	Damp dark yellow brown & light gray clayey silty SAND w/ gravel @ 16.0' (SM) w/ coal pieces	▼	51-40-61	
18.9	Dry gray sandy GRAVEL (GP) w/ rock fragments		100/.3	
20.5	Dry gray silty SAND w/ gravel (SP-SM) w/ rock fragments		100	
	Bottom of Hole			

(***) Gravels are rock fragments

DH-304
GROUND WATER DATA
▽ WHILE DRILLING: NE
▽ ON COMPLETION: NE
▼ 24 Hr. READING: 14.6

Fill Auger SPT RB Cored

EO-2 05BLL 5/3/96 14:12

STA.	Lackawanna River LFPP	N	OL1-1
OFFSET:	Olyphant	E	1 of 2
TOP ELEV:	HTRW Investigation	COMPLETED: May 2, 1995	

	(c)	(d)	(a)	(b)
2.0	Fill, dry, orange-brown silty fine sand with gravel.		3-5-6-7	
4.0	Fill, dry brown sand with angular gravel and concrete.		5-9-10-8	
6.0	Fill, dry brown silty fine sand with angular gravel and coal.	5	6-3-2-3	
8.0	Fill, moist, brown sandy silt with ash and wood.		2-2-2-3	
10.0	Fill, dry brown soft, silty sand with gravel, brick, and ash.		3-3-3-5	
12.0	Fill, moist, soft, sandy silt with coal and angular rock fragments	10	1-3-6-5	
14.0	Fill, dry, brown-black small gravel, coal, and sand.		7-7-5-21	
16.5	Fill, dry black-red gravel, coal, and ash.	15	12-14-10-7-8	
19.0	Fill, dry black small coal fragments.		6-5-3-5-8	
20.0	Augered. No Sample.	20		
22.5	Fill, dry black sandy ash and coal.		11-9-8-7-7	
25.0	Fill, dry concrete fragments to light brown fine to medium sand.		8-20-39-18-9	
27.5	Fill, dry black silty sand with gravel and coal pieces.	25	9-27-21-22-29	
30.0	Dry light brown fine Sand, well sorted.		17-4-5-7-6	
	Bottom of Hole	30		
		35		

Sample	Depth	Analysis
OL1-1S1	0.0-4.0	TPH, BTEX
OL1-1S2	4.0-8.0	TPH, BTEX
OL1-1S3	8.0-12.0	TPH, BTEX
OL1-1S4	12.0-14.0	TPH, BTEX
OL1-1S5	14.0-19.0	TPH, BTEX
OL1-1S6	20.0-25.0	TPH, BTEX
OL1-1S7	25.0-30.0	TPH, BTEX
OL1-1S8	Trip Blk.	TCL VOC
OL1-1S9	Decon Water	BTEX

OL1-1
GROUND WATER DATA
▽ WHILE DRILLING: NE
▽ ON COMPLETION: DRY
▽ 24 Hr. READING: NT

Fill Auger SPT RB Cored

STA.	Lackawanna River LFPP	N	OL1-1
OFFSET:	Olyphant	E	2 of 2
TOP ELEV:	HTRW Investigation	COMPLETED: May 2, 1995	

(c) (d) (a) (b)

Sample	Depth	Analysis
OL1-1S10	Decon Water	TPH
OL1-1S11	Rinsate	TPH
OL1-1S12	Rinsate	PCB

NOTE:
Soils are field classified only.

45
50
55
60
65
70
75
80

Fill Auger SPT RB Cored

STA.	Lackawanna River LFPP	N	OL1-2
OFFSET:	Olyphant	E	1 of 1
TOP ELEV:	HTRW Investigation	COMPLETED: May 2, 1995	

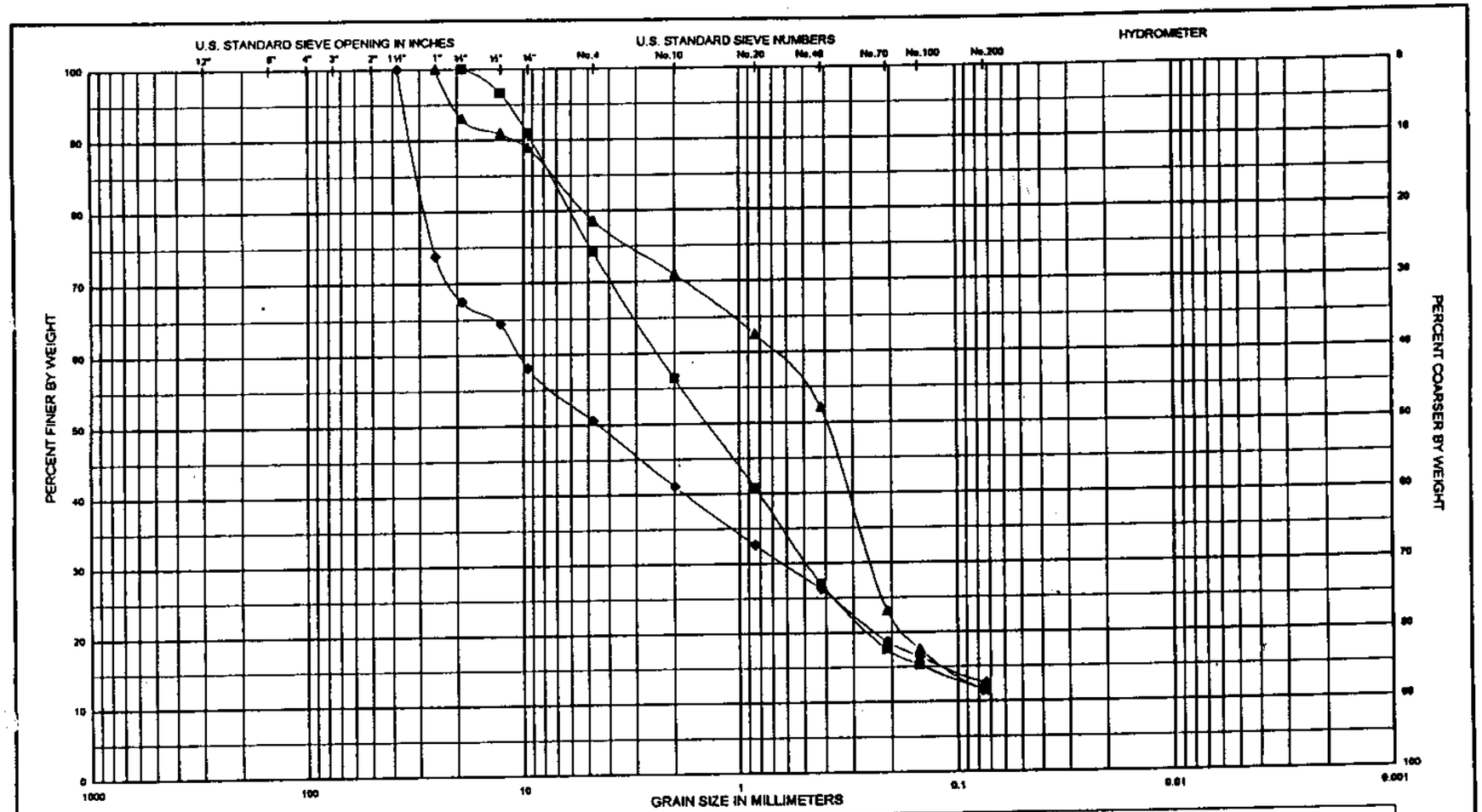
	(c)	(d)	(a)	(b)
2.5	Fill, dry black silty sand with coal and gravel.		3-12-18-9-9	
5.0	Fill, dry brown silt and gravel with concrete at 4.6'.		3-18-39-41-19	
7.5	Fill, dry brown silty fine sand with angular gravel, coal, glass, metal, and ash.		4-9-9-8-7	
10.0	Fill, dry brown silty fine sand with angular gravel, coal, glass, metal, and ash.		5-22-24-26-33	
12.5	Fill, dry brown silty sand with gravel and concrete.		2-20-9-5-6	
15.0	Fill, dry black coal and fine sand.		2-3-2-2-3	
17.5	Fill, moist black silty sand with coal and gravel.		3-7-8-8-8	
20.0	Fill, dry light brown poorly sorted sand and gravel.		7-9-8-8-6	
22.5	Fill, dry brown and black fine sand, ash, and coal.		15-15-12-10-8	
25.0	Fill, dry brown and black fine sand, ash, and coal.		9-9-10-8-10	
27.5	Fill, dry light brown and black fine to medium sand with coal.		7-7-7-9-8	
30.0	Fill, dry light brown and black fine to medium sand with coal.		5-8-9-10-8	
	Bottom of Hole			

Sample	Depth	Analysis
OL1-2S1	0.0-5.0	TPH, BTEX
OL1-2S2	5.0-10.0	TPH, BTEX
OL1-2S3	10.0-15.0	TPH, BTEX
OL1-2S4	15.0-20.0	TPH, BTEX
OL1-2S5	20.0-25.0	TPH, BTEX
OL1-2S6	25.0-30.0	TPH, BTEX

NOTE:
Soils are field classified only.

OL1-2
GROUND WATER DATA
▽ WHILE DRILLING: NE
▽ ON COMPLETION: DRY
▽ 24 Hr. READING: NT

Fill Auger SPT RB Cored



Legend	Sample No.	Depth (ft)	Classification		Nat w%	LL	PL	PI
—●—	Jar-4	4.5-5.9	Well-graded sand with silt and gravel	(SW-SM)	4.1		N.P.	
—◆—	Jar-5	6.0-7.5	Silty gravel with sand	(GM)				
—▲—	Jar-6, 7	7.5-11.5	Well-graded sand with silt and gravel	(SW-SM)				

PROJECT: Lackawanna River
Local Flood Protection Project

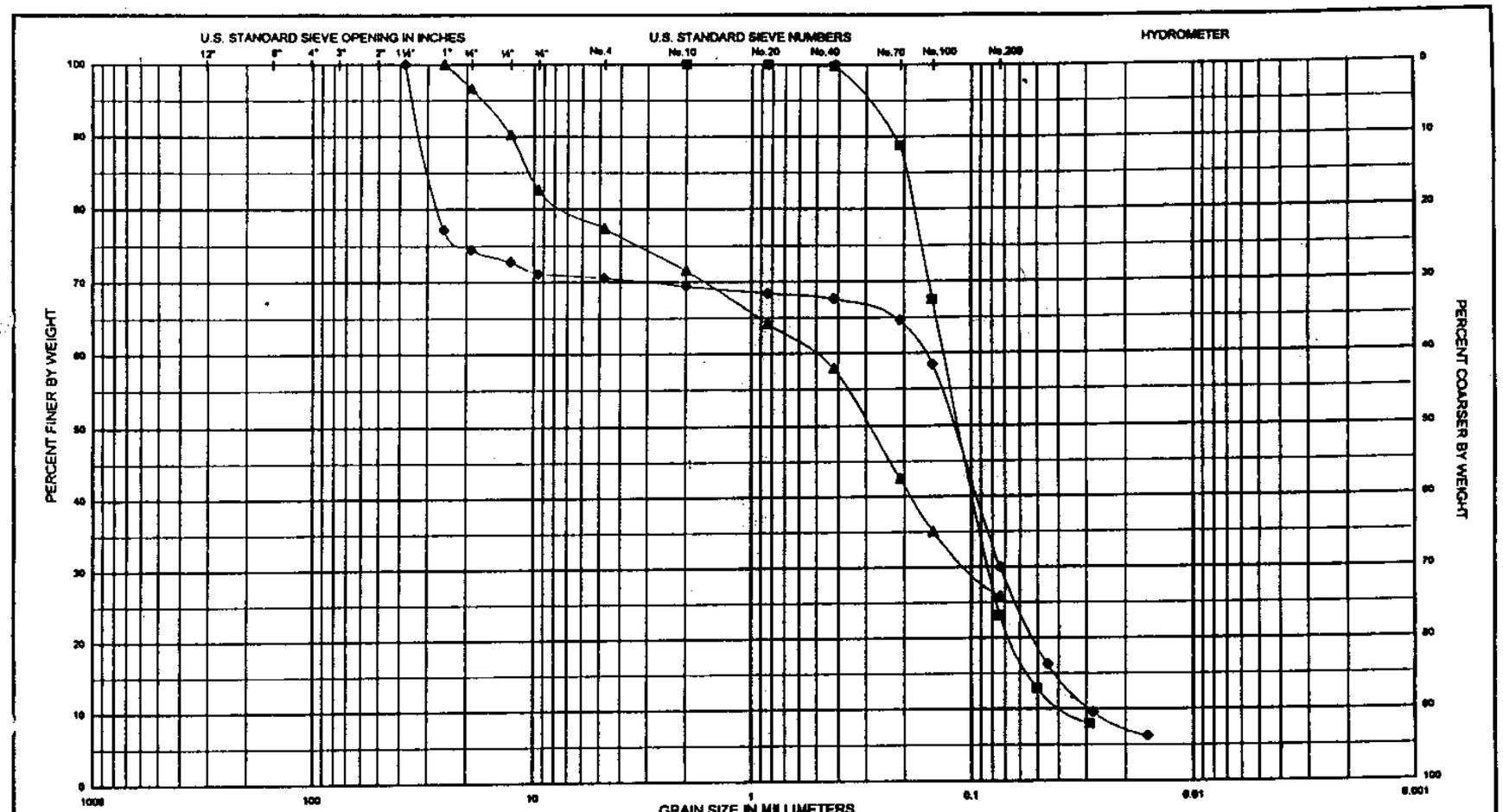
AREA: Olyphant, PA

Boring No.: DH-301 Sht. 1 of 2

DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES



Legend	Sample No.	Depth (ft)	Classification		Nat w%	LL	PL	PI
—■—	Jar-8	12.5-14.0	Silty sand	(SM)	7.7		N.P.	
—◆—	Jar-9	15.0-16.5	Silty sand with gravel	(SM)	12.7			
—▲—	Jar-10, 11	17.5-21.5	Silty sand with gravel	(SM)				

ENG FORM 2087

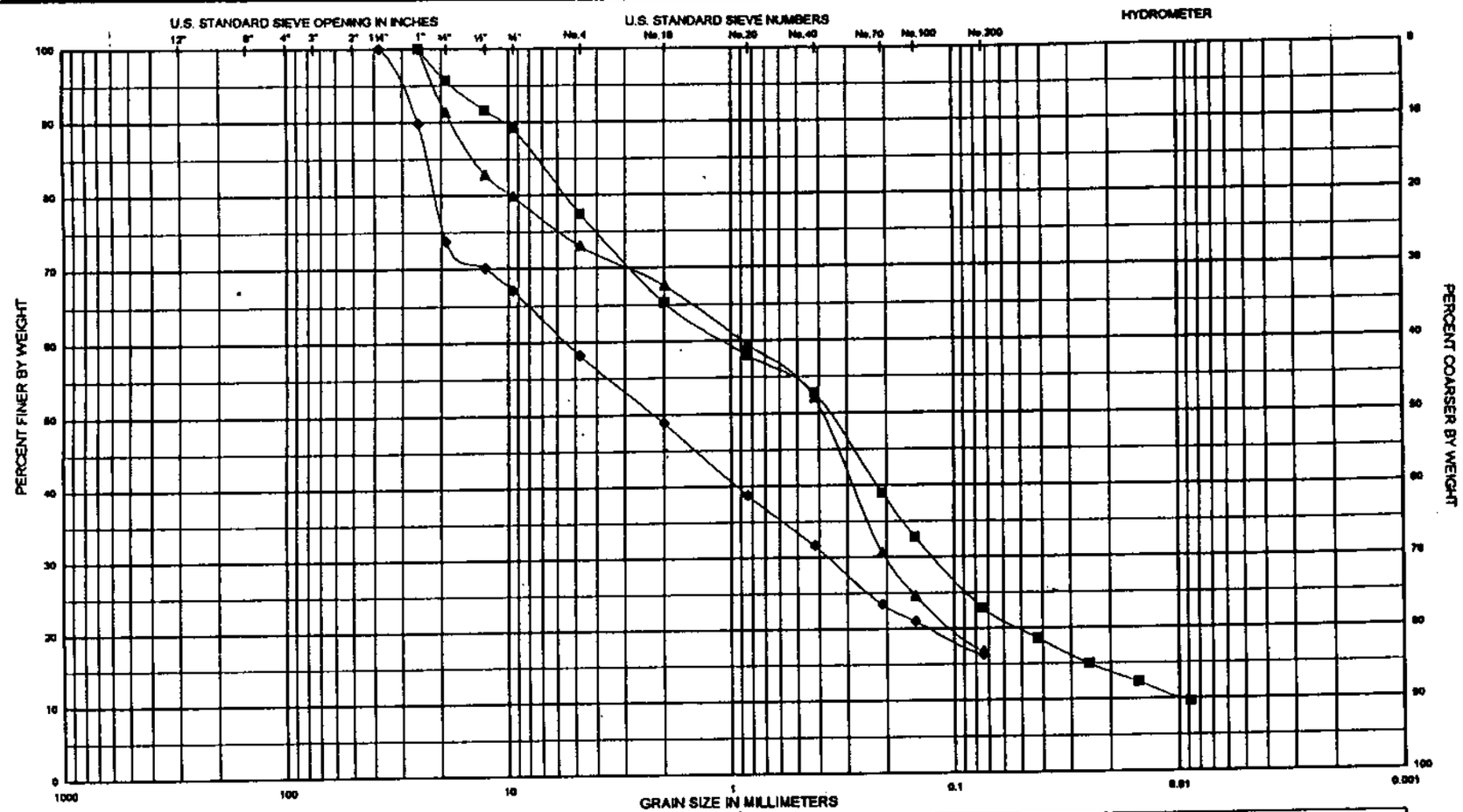
GRADATION CURVES

PROJECT: Lackawanna River
Local Flood Protection Project

AREA: Olyphant, PA

Boring No.: DH-301 Sht. 2 of 2

DATE: Sep 1995

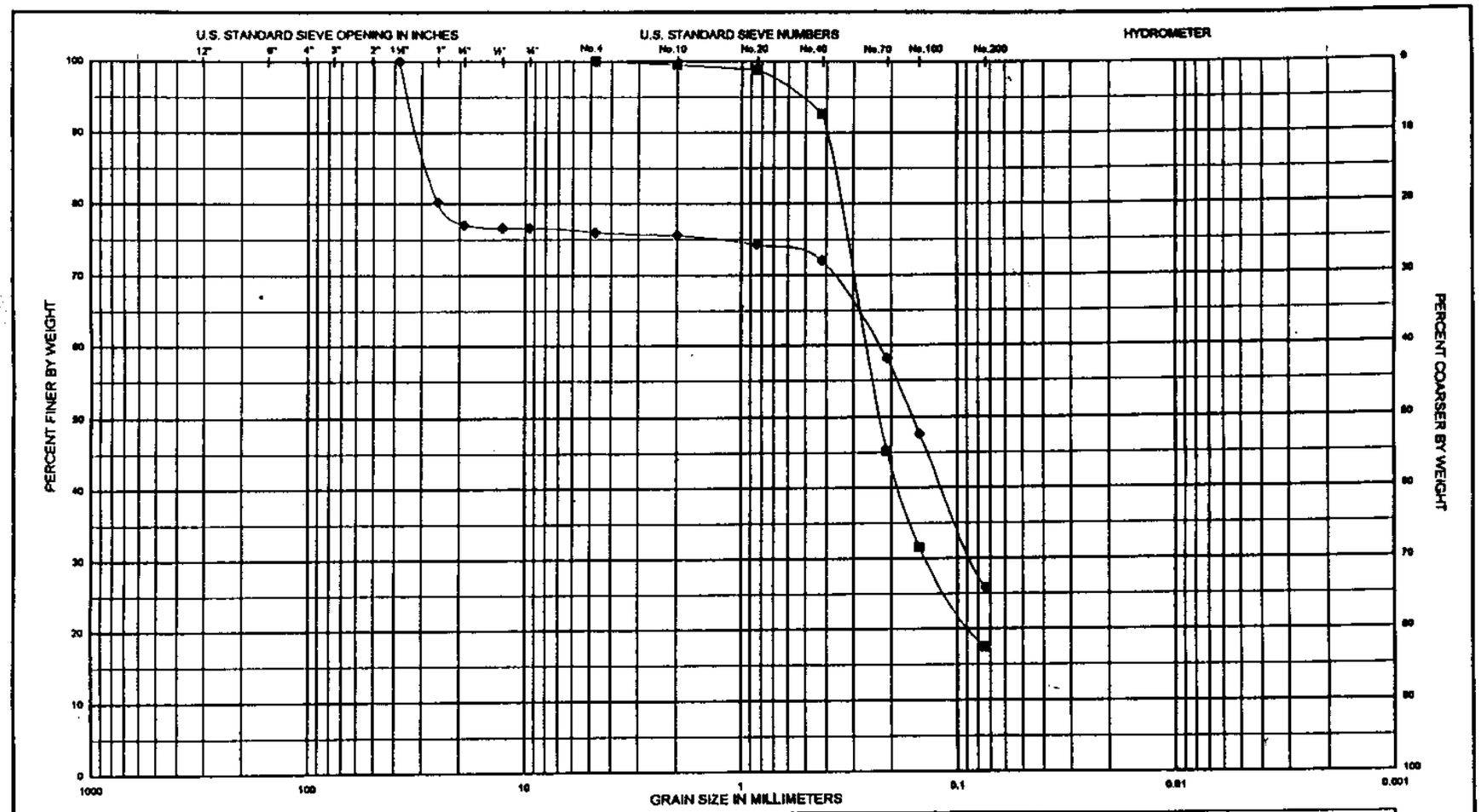


Legend	Sample No.	Depth (ft)	Classification		Nat w%	LL	PL	PI
—■—	Jar-3	3.0-4.5	Silty clayey sand with gravel	(SC-SM)	10.0	25	20	5
—◆—	Jar-4	4.5-6.0	Silty sand with gravel	(SM)				
—▲—	Jar-5*	6.0-7.5	Organic silty sand with gravel	(SM)	13.6			
	"	"	* L.O.I. = 13.7% - Organic					

PROJECT: Lackawanna River
Local Flood Protection Project
AREA: Olyphant, PA
Boring No.: DH-302 Sht. 1 of 2
DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES

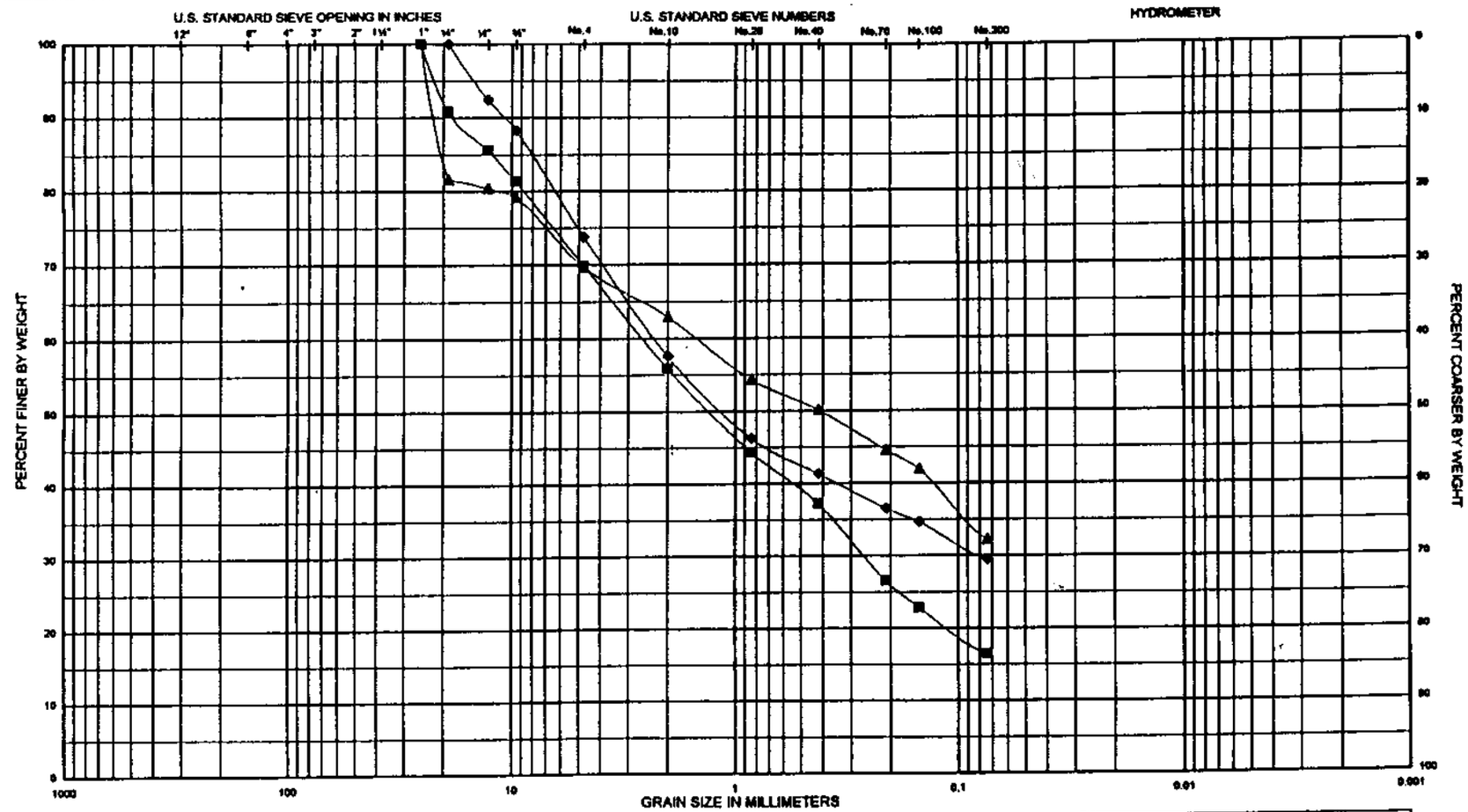


Legend	Sample No.	Depth (ft)	Classification	Nat w%	LL	PL	PI
—■—	Jar-6	7.5-9.0	Silty sand (SM)				
—◆—	Jar-8	10.5-12.0	Silty sand with gravel (SM)				

PROJECT: Lackawanna River
Local Flood Protection Project
AREA: Olyphant, PA
Boring No.: DH-302 Sht. 2 of 2
DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES

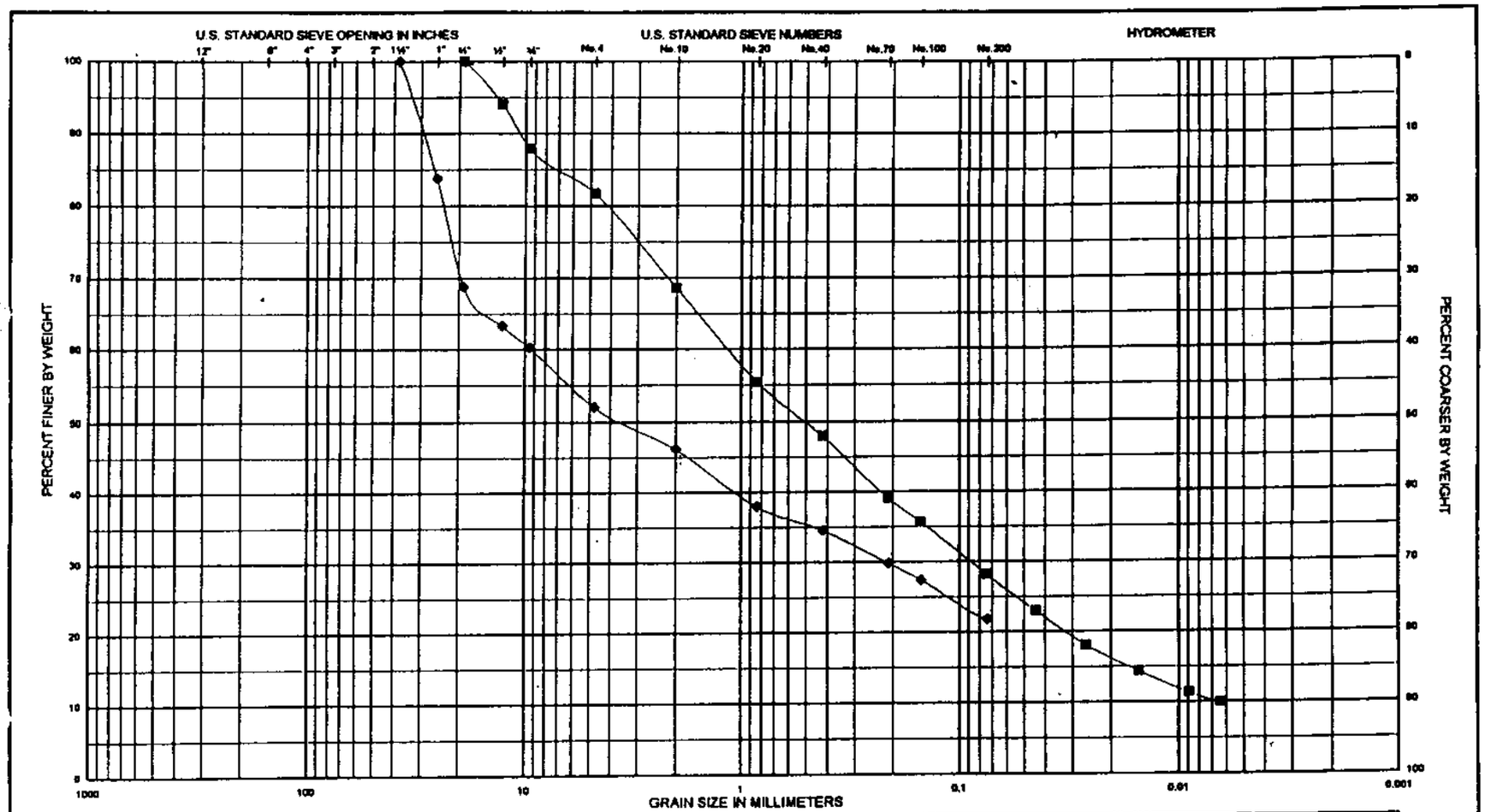


Legend	Sample No.	Depth (ft)	Classification	Nat w%	LL	PL	PI
—■—	Jar-1, 2	0.0-3.0	Silty sand with gravel FILL (SM)				
—◆—	Jar-3	3.0-4.5	Silty clayey sand with gravel (SC-SM)	8.5	26	20	6
—▲—	Jar-4	4.5-6.0	Silty sand with gravel (SM)				

PROJECT: Lackawanna River
Local Flood Protection Project
AREA: Olyphant, PA
Boring No.: DH-303 Sht. 1 of 2
DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES

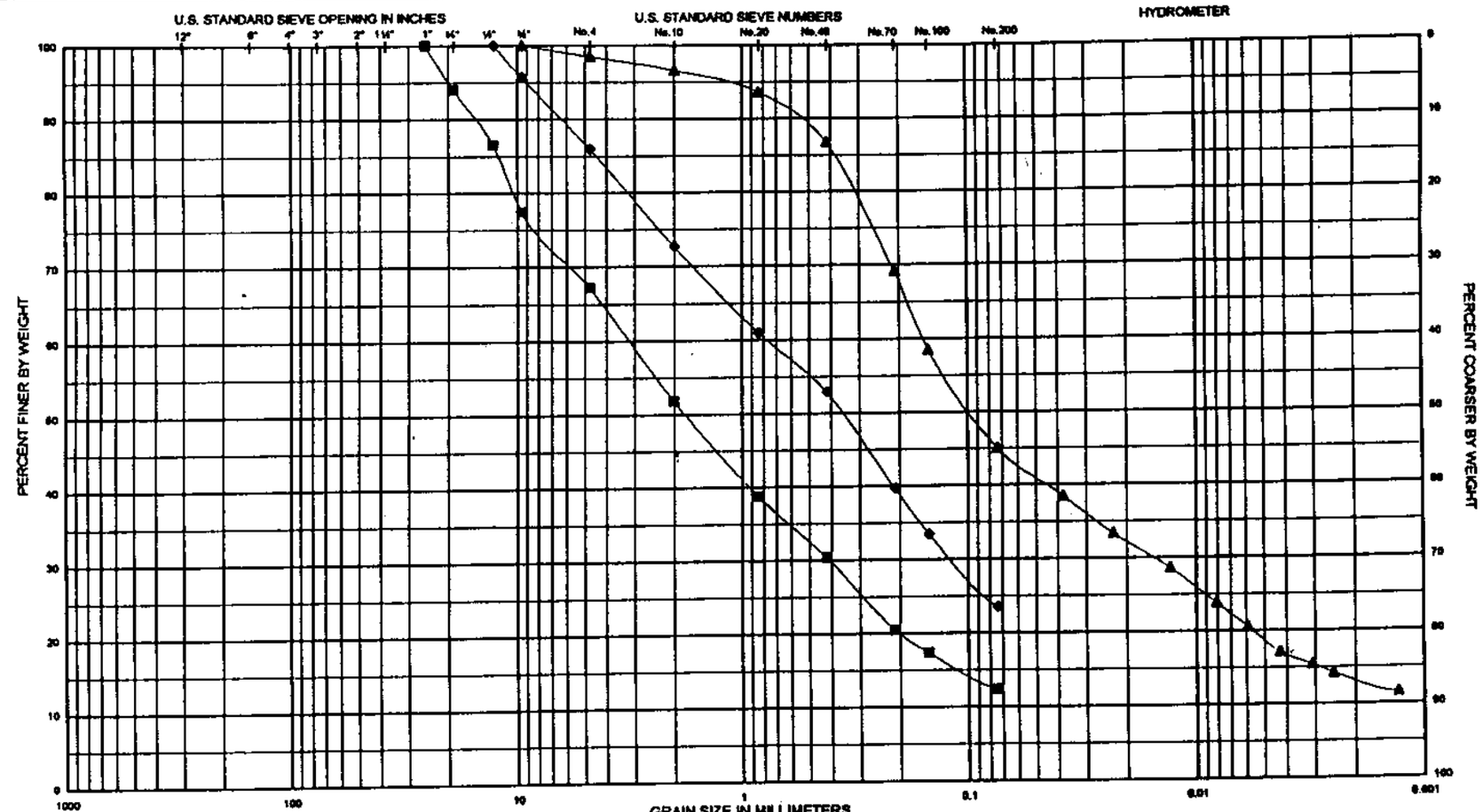


Legend	Sample No.	Depth (ft)	Classification		Nat w%	LL	PL	PI
—■—	Jar-5	6.0-7.5	Silty sand with gravel	(SM)	11.6		N.P.	
—◆—	Jar-6	7.5-9.0	Silty gravel with sand	(GM)				

PROJECT: Lackawanna River
Local Flood Protection Project
AREA: Olyphant, PA
Boring No.: DH-303 Sht. 2 of 2
DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES



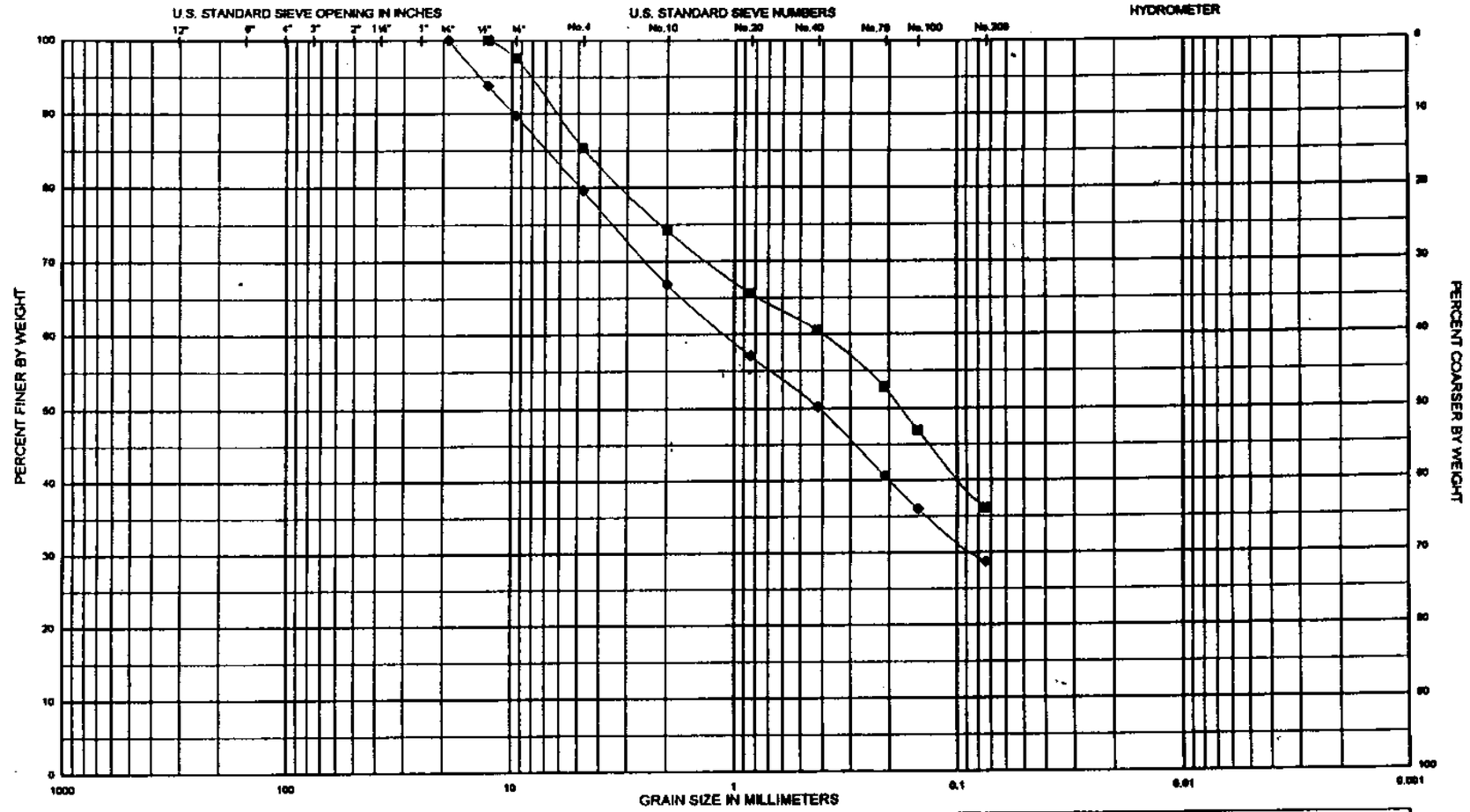
BOULDERS	COBBLES	GRAVEL		SAND			SILT or CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification	Nat w%	LL	PL	PI
—■—	Jar-2	1.5-3.0	Silty sand with gravel FILL (SM)				
—●—	Jar-3	3.0-4.5	Silty sand (tr. gravel) FILL (SM)				
—▲—	Jar-4	4.5-6.0	Clayey sand (tr. gravel) (SC)	15.3	29	19	10

PROJECT: Lackawanna River
Local Flood Protection Project
AREA: Olyphant, PA
Boring No.: DH-304 Sht. 1 of 2
DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES



Legend	Sample No.	Depth (ft)	Classification	Nat w%	LL	PL	PI
—■—	Jar-5	6.0-7.5	Clayey sand (tr. gravel) (SC)				
—◆—	Jar-6	7.5-9.0	Silty sand with gravel (SM)				

PROJECT: Lackawanna River
Local Flood Protection Project
AREA: Olyphant, PA
Boring No.: DH-304 Sht. 2 of 2
DATE: Sep 1995

ENG FORM 2087

GRADATION CURVES

SITE SUMMARY DATA

Physical Data:

The USACE performed a preliminary site investigation within the construction limits of the flood protection project. The preliminary site investigation was not intended to provide detailed characterization of the nature and extent of contaminants, but rather to provide confirmation that contamination is present and to identify the contaminants of concern. Sites selected for sampling were based on a preliminary assessment that had identified the potential for the presence of hazardous or toxic wastes in the proposed construction areas due to current and past industrial operations.

Based on the sample results obtained, two reaches along the proposed levee construction in the Olyphant Area have been identified with potential hazardous and toxic wastes. Elevated levels of various petroleum hydrocarbons have been identified along stations 0+00 to 2+70. A summary of the maximum concentrations found for petroleum hydrocarbons, various organic and inorganic constituents analyzed are presented in the tables listed below. A table presenting the borehole identification, the corresponding station locations and Site Identification descriptions corresponding to each sample number listed in the table is also presented.

Site Conditions

Various fill materials were encountered at the majority of the sampling locations. Frequently, the fill material consisted of some combination of ash and coal fragments with gravel, brick, glass, wood, and concrete. Where borings extended below the depth of fill, sands, silty sands and gravels were encountered. It is known that along reaches of the Lackawanna River coal refuse combined with various construction type debris was used as random fill. Pennsylvania recognizes that PAH compounds and metals are commonly associated with coal refuse materials.

TABLE 1-1

BOREHOLE	STATION
OL1-1	1+50
OL1-2	2+20

TABLE 1-2

PETROLEUM HYDROCARBONS EXCEEDING CLEANUP STANDARDS

Sample Depth	Sample Number	Concentration mg/Kg
0-5'	OL1-1S1	587
10'-15'	OL1-1S3	513
10'-15'	OL1-1S4	5030
0-5'	OL1-2S1	1640

Sample Number	Concentration mg/Kg	Sample Depth
OL1-2S2	969	5'-10'

TABLE 1-3

MAXIMUM CONCENTRATIONS SUMMARY
Volatile and Semi-Volatile Compounds

Sample Depth	Sample No.	Group	Compound	Max. Conc. (ug/Kg)	TWA/TLVs (mg/m^3)
10'-15'	OL1-1S4	VOCs	Ethylbenzene	3.2	434
10'-15'	OL1-1S4		Xylene(s)	4.9	434
10'-15'	OL1-1S4	TPHs		5030 mg/Kg	890

Notes:
A2 Suspected Human Carcinogens

Reference: Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Government Industrial Hygienists

4.2 Site Identification

Sites were sampled in April of 1994 and in June of 1995. Sampling at two locations was delayed due to difficulties in obtaining rights of entry and one location was delayed due to difficulties accessing the borehole. Table 1-1 contains the boring station locations.

Site OL1: Site OL1 is topographically downgradient from an active gas station. There is evidence of the recent addition of fill to this site. The construction of a storm drainage culvert with discharge to the river is proposed for this area. Two boreholes, each thirty feet deep were sampled. Samples were analyzed for BTEX and TPH.

Background: One fifteen foot borehole was sampled in an assumed clean area in order to provide information comparison purposes. Samples were analyzed for TAL metals and TCL: volatiles, semi-volatiles, pesticides and PCBs.

END

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 LOCAT ORS _____

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

PART 1 GENERAL

1.1 APPLICABLE PUBLICATION

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

U.S. ARMY CORPS OF ENGINEERS:

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

1.2 SUBMITTALS

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

SD-01 Data

Safety Supervisor; GA|AR.

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

SD-09 Reports

Activity Phase Hazard Analysis Plan; GA|AR.

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

Accident Prevention Plan; GA|AR.

Contractor's proposed measure to minimize accidents.

Outline Report; FIO.

A report for each past activities review.

OSHA Log; FIO.

A log shall be reported monthly for injuries.

SD-18 Records

Language Certificate; GA|AR.

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

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, 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's name and qualifications shall be submitted in writing for approval to the Contracting Officer's Representative. This individual must have prior experience as a safety engineer or be able to demonstrate his/her familiarity and understanding of the safety requirements over a prescribed trial period. The safety engineer shall have the authority to act on behalf of the Contractor's general management to take whatever action is necessary to assure compliance with safety requirements. The safety supervisor is required to be on the site when work is being performed.

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

(1) Contracts Accident Prevention Plan: An acceptable accident

prevention plan, written by the prime Contractor for the specific work and implementing in detail the pertinent requirements of EM 385-1-1, shall be submitted for Government approval.

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

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

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

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

1.4 ACCIDENTS

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

1.4.1 Accident Reporting, ENG FORM 3394

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

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

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

c. A statement as to whether or not the employee was permitted to return to work after examination and treatment by the doctor, and if not, an estimate or statement of the number of days lost from work. If there

have been days lost from work, state whether or not the employee has been re-examined and declared fit to resume work as of the date of the report.

1.4.2 OSHA Requirements

1.4.2.1 OSHA Log

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

1.4.2.2 OSHA Inspections

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

1.5 GOVERNMENT APPROVAL

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

a. Written designation of safety representative.

b. Written project specific accident prevention plan.

c. Written activity phase hazard analysis plan.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01270

MEASUREMENT AND PAYMENT

1. SCOPE: This section covers the methods and procedures which will be used to measure the Contractor's work and to effect payment.

2. GENERAL: The general outline of the principal features of each item as listed does not in any way limit the responsibility of the Contractor for making a thorough investigation of the drawings and specifications to determine the scope of work under the entire contract. Payment to the Contractor of the amounts based on the quantities of work as measured in accordance with the specified methods of measurement and the prices stipulated in the accepted proposal will constitute complete compensation for all work shown on the drawings, provided in the specifications or other Contract Documents and all costs of accepting the general risks, liabilities and obligations expressed or implied. Payment under all items shall include, but not necessarily be limited to, compensation for furnishing all supervision, labor, equipment, materials and services (including overhead and profit), as well as performing all work required to accomplish and complete the work specified under each item and other work required.

3. LUMP SUM ITEMS:

3.1 The quantities under lump sum items will not be measured except for the purpose of determining reasonable interim payments.

3.2 Interim payments will be made in accordance with the estimated value of work done as determined by the Contracting fficer or as specified in this section, and in accordance with the PAYMENTS clause of the CONTRACT CLAUSE.

4. UNIT PRICE ITEMS:

4.1 Excavation and/or removal items and fill items will be measured from existing ground levels to excavation surfaces shown on the drawings or as directed by the Contracting Officer.

4.1.1 Existing ground levels shall be surveyed by the Contractor prior to any disturbances in accordance with the relevant provisions of these specifications.

4.1.2 In the event excavation surfaces are not clearly shown on the drawings, the Contractor shall obtain clarification from the Contracting Officer prior to commencement of excavation and/or removal.

4.2 QUANTITY SURVEYS:

4.2.1 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.

4.2.2 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.

4.2.3 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. (CENAB)

4.2.4 The Contractor shall develop, or obtain, a quantity calculation program, which shall rely on IBM compatible software, and which shall be utilized to calculate the quantities upon which progress payment requests will be based. The quantity calculation program shall calculate quantities, using an inputted centerline elevation and the contract specified templates, as the basis for developing the cross-sectional area for each station. The quantity calculation program shall incorporate the ability to correct quantities for curves, either to the right or to the left, in the centerline alignment. The Contractor shall conduct a centerline survey, for all

payment quantities for which progress payments are being requested, to determine the centerline elevations, and shall utilize the quantity calculation program to calculate quantities each time a progress payment request is submitted. The calculated quantities shall be the sole basis for making progress payments on unit price items. The quantity calculation program shall only be used for progress payments. Final quantity calculations shall be based upon measurement of the cubic yards in place, or excavated, as the case may be, between the existing ground surface and the fill/excavation lines shown on the drawings or as specified in the specifications. Measurement for the final quantities shall be by the average end area method. A copy of the software which is purchased or developed for use in complying with this specification paragraph shall be provided to the Contracting Officer and become the property of the Government. The Government shall also receive a copy of any/all instruction manuals or literature related to the quantity calculation program.

4.3 Interim measurements and/or payments may be adjusted to take account of partially completed work.

5. PAYMENT ITEMS:

5.1 GARFIELD AVENUE STORMWATER TRANSPORT SYSTEM (ITEM NO. 0001). Payment for Garfield Avenue drainage structures shall include all work, labor, equipment and materials required to complete construction of the Garfield Avenue stormwater transportation system as shown on the drawings and as specified. Payment for the cost of the PennDOT District 4-0 inspector, approximately $260/day, shall be included within this bid item.

5.2 TESTING, HANDLING AND DISPOSAL OF CONTAMINATED MATERIAL (ITEM NO. 0002). Payment for testing, handling and disposal of contaminated material shall be made at the contract unit price per cubic yard under Payment Item No. 0002, “Testing, Handling and Disposal of Contaminated Material,” of the Price Schedule. The unit price shall include all labor, equipment, and materials required for testing all material and soil excavated between Garfield Avenue stormwater transport system Stations 0+00 to 2+70 for total petroleum hydrocarbons (TPH) above regulatory limits, special handling, transportation, and disposal of material and soil at an approved site. Costs for excavation of soil shall be

paid for under Payment Item No.0001, “Garfield Avenue Stormwater Transport System.”

5.3 UTILITY RELOCATIONS (ITEM NO. 0003). Payment for all associated utility relocations, to include all work, labor, equipment and materials. Costs for excavation of soil shall be paid for under Payment Item 0001, “Garfield Avenue Stormwater Transport System.”

END

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION

Submittals required are identified by SD numbers as follows:

SD-01 Data

SD-04 Drawings

SD-06 Instructions

SD-07 Schedules

SD-08 Statements

SD-09 Reports

SD-13 Certificates

SD-14 Samples

SD-18 Records

SD-19 Operation and Maintenance Manuals

1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.2.1 Government Approved

Governmental 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.

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 CQC requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.5 WITHHOLDING OF PAYMENT

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

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) representative and each item shall be stamped, signed, and dated by the CQC representative 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 (ENG FORM 4288)

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 as a diskette containing the computerized ENG Form 4288 and instructions on the use of the diskette. Columns "c" through "p" have been completed by the Government; the Contractor shall complete columns "a, " "b," and "q" through "y" 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.

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)

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

3.5 SUBMITTAL PROCEDURE

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

3.5.1 Procedures

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

submittal may be returned for corrective action.

3.5.2 Responsibility

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

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

3.6 CONTROL OF SUBMITTALS

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

3.7 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Four (4) copies of the submittal will be retained by the Contracting Officer and two (2) copies of the submittal will be returned to the Contractor.

3.8 INFORMATION ONLY SUBMITTALS

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

3.9 STAMPS

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

CONTRACTOR

(Firm Name)

_____ Approved

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

SIGNATURE: _____

TITLE: _____

DATE: _____

3.10 CERTIFICATES OF COMPLIANCE

(MAY 1969) Any Certificate required for demonstrating proof of compliance of materials with specification requirements shall be executed in four (4) copies. Each certificate shall be signed by an official authorized to certify in behalf on the manufacturing company and shall contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material, if, after tests are performed on selected samples, the material is found not to meet the specific requirements. (CENAB)

Attachments:
ENG FORM 4288 SEP 93
ENG FORM 4025 MAR 95

-- End of Section --

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01000

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARA GRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	PROGRESS SCHEDULE				X							X	AR									
		1.3	TITLE EVIDENCE									X	X		AR									
		1.5	INVOICE COPIES									X	X		AR									
		1.6	EQUIPMENT DATA	X									X		AR									
		1.8	O&M DATA			X							X		AR									
		1.10	PHOTOGRAPHS									X	X		AR									

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Garfield Avenue, Olyphant, PA

CONTRACTOR

SPECIFICATION SECTION
01050

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	CERTIFICATES: REPORTS k.	CERTIFICATES: SAMPLES l.	CERTIFICATES: RECORDS m.	O&M MANUALS n.	CLASSIFICATION: INFORMATION ONLY p.	CLASSIFICATION: GOVERNMENT APPROVED q.	CLASSIFICATION: REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	CONTRACTOR SCHEDULE DATES: APPROVAL NEEDED BY t.	CONTRACTOR SCHEDULE DATES: MATERIAL NEEDED BY u.	CONTRACTOR SCHEDULE DATES: CODE v.	CONTRACTOR ACTION: DATE w.	CONTRACTOR ACTION: SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	GOVERNMENT ACTION: DATE z.	REMARKS aa.
			1.4.3	Shut Down Utility Services			X								X	AR									
			1.3	Advance Notice			X							X											
			1.4.7	Checklist			X								X	AR									
			1.6.4	Engineering Assessment						X					X	AR									
			1.6.2	Traffic Control Plan			X								X	AR									
			1.4	Utility Coordination Records									X	X											
			1.13.2	Work Plans									X		X	AR									
			1.13.5	Agreements and Correspondence									X	X											

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01060

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	LANGUAGE CERTIFICATION							X			X		AR									
		1.2	SAFETY SUPERVISOR	X										X	AR									
		1.2	ACCIDENT PREVENTION PLAN									X		X	AR									
		1.2	ACTIVITY HAZARD ANALYSIS						X					X	AR									
		1.2	OUTLINE REPORT						X				X		AR									
		1.2	OSHA LOG									X	X		AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01351

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.17.1	WORK ZONES		X									X	AR									
		1.18.1	DECONTAMINATION FACILITIES		X								X		AR									
		1.19.1	DECONTAMINATION FACILITIES		X								X		AR									
		1.3	MONITORING/SAMPLING RESULTS						X				X		AR									
		1.3	SITE SAFETY AND HEALTH PLAN						X					X	AR									
		1.17.2	SITE CONTROL LOG						X				X		AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01450

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		3.3	SAMPLING AND ANALYSIS PLAN	X										X	AR									
		1.6	QUALITY ASSURANCE SAMPLE COLLECTION AND ANALYSIS						X				X		AR									
		3.4	CHEMICAL DATA PACKAGE						X				X		AR									
		3.7	CHEMICAL DATA FINAL REPORT						X					X	AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01451

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		3.2.1	CQC PLAN	X		X	X	X	X	X	X	X		X	AR									
		3.2.4	CHANGE NOTIFICATION					X					X		AR									
		3.3	MINUTES									X	X		AR									
		3.6.1k	PHASE NOTIFICATION					X					X		AR									
		3.6.2f	PHASE NOTIFICATION					X					X		AR									
		3.7.1	TESTS						X				X		AR									
		3.7.1e	TESTS PERFORMED									X	X		AR									
		3.7.1e	TEST REPORTS						X				X		AR									
		3.8.1	PUNCHLIST					X					X		AR									
		3.9	QC RECORDS									X		X	AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01561

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		9.4	FACILITIES PLAN					X						X	AR									
		9.5	TEMPORARY PLAN					X						X	AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 01720

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3	CADD FILES	X									X		AR									
		1.3	PROGRESS PRINTS		X									X	AR									
		1.3	FINAL PRINTS		X									X	AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION
GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION
02111

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	SURVEYS						X						X	AR									
			1.4	EXCAVATION & HANDLING WORK PLAN	X											X	AR									
			1.4	CLOSURE REPORT						X						X	AR									
			1.7	CHEMICAL TESTING						X						X	AR									
			3.2.1	EXCAVATION LOGS						X					X		AR									
			3.5.1	SAMPLING OF STORED MATERIAL						X						X	AR									
			3.6.2	COMPACTION						X						X	AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02120

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	ON-SITE HAZARDOUS WASTE MANAGEMENT	X										X	AR									
		1.2	OFF-SITE HAZARDOUS WASTE MANAGEMENT	X										X	AR									
		1.2	EXCEPTION REPORTS						X					X	AR									
		1.2	OFF-SITE POLICY COMPLIANCE CERTIFICATION						X				X											
		1.2	CERTIFICATES OF DISPOSAL						X				X		AR									
		1.2	PACKAGINGS CERTIFICATIONS						X					X	AR									
		1.2	NOTICES OF NON-COMPLIANCE & NOTICES OF VIOLATION									X	X		AR									
		1.3	QUALIFICATIONS							X			X		AR									
		3.7	RECORDKEEPING						X					X	AR									
		3.8	SPILL RESPONSES						X				X		AR									

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION

02200

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			4.2.3.2	DEWATERING PLAN	X											X	AR/ ED									
			4.2.4	SHORING PLAN	X	X										X	AR/ ED									
			5.	DISPOSAL OF MATERIAL					X						X		AR									

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION

02216

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			5	WARRANTY					X						X		AR									
			6.1	MATERIAL SAMPLES	X						X	X				X	AR/ ED									
			7.1	TEST RESULTS AND SAMPLES	X						X	X				X	AR/ ED									
			9	INSTALLATION PLAN		X	X									X	AR/ ED									
			10	SEAM SEWING PLAN	X	X	X									X	AR/ ED									
			11	PIPE PENETRATIONS & ABUTTING STRUCTURES		X	X									X	AR/ ED									
			12	DEFECT REPAIR PLAN		X	X									X	AR/ ED									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02220

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3	WORK PLAN					X						X	AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02316

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3, 3.4	FIELD DENSITY TESTS						X				X		AR									
		1.3, 3.4	SOIL TEST RESULTS						X				X		AR									
		1.3, 3.1.1	SHORING AND BRACING PLANS		X	X			X	X				X	ED									
		1.3, 3.1.3	DRAINAGE AND DEWATERING PLANS		X	X			X	X				X	ED									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02510

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3	INSTALLATION		X								X		AR									
		1.3	WASTE WATER DISPOSAL METHOD					X						X	AR									
		1.3	SATISFACTORY INSTALLATION					X					X		AR									
		1.3	BACTERIOLOGICAL DISINFECTION						X				X		AR									
		1.3	INSTALLATION							X			X		AR									

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SUBMITTAL REGISTER
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CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02531

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.4	PORTLAND CEMENT							X				X	AR									

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CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION

02542

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3, 2.1.6 & 2.1.7	STONE SOURCE SUBMITTAL	X					X						X	ED									
			1.3	CONSTRUCTION METHODS	X	X		X		X						X	AR/ ED									
			1.3, 2.1.4 & 2.1.7	STONE QUALITY CONTROL TESTING RESULTS	X					X						X	AR/ ED									
			1.3, 2.1.2 & 3.4.2	RIPRAP GRADATION TEST RESULTS	X					X					X		AR/ ED									
			1.3, 2.2 & 3.4.1	BEDDING MATERIAL GRADATION TEST RESULTS	X					X					X		AR/ ED									
			1.3 & 2.1.6	STONE SAMPLES								X			X		ED									
			1.3 & 3.4.3	STONE PLACEMENT RECORDS						X				X	X		ED									

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Garfield Avenue, Olyphant, PA

CONTRACTOR

SPECIFICATION SECTION
02550

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CODE v.	CONTRACTOR ACTION: DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.2	Asphalt Mix Design						X						X	ED									
			3.2	Density Testing						X					X											
			2.2	Plant Control						X						X	AR									
			3.3.2.1	Base Course Test Results						X					X											
			2.5	Tack Coat							X				X											
			2.4	Prime Coat							X				X											

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02720

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3	PLACING PIPE			X							X		AR									
		1.3	RESIN CERTIFICATION; FRAME AND COVER FOR GRATINGS							X			X		AR									

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CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 02921

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	EQUIPMENT; SURFACE EROSION CONTROL MATERIAL; CHEMICAL TREATMENT MATERIAL	X									X		AR									
		1.2	EQUIPMENT				X						X		AR									
		1.2	DELIVERY					X					X		AR									
		1.2	FINISHED GRADE & TOPSOIL					X					X		AR									
		1.2	TOPSOIL					X						X	ED									
		1.2	EQUIPMENT CALIBRATION						X				X		AR									
		1.2	SOIL TEST						X					X	ED									
		1.2	TOPSOIL; PH ADJUSTER; FERTILIZER; ORGANIC MATERIAL; SOIL CONDITIONER; MULCH							X				X	ED									
		1.2	DELIVERED TOPSOIL; SOIL AMENDMENTS; MULCH								X			X	ED									
		1.2	QUALITY CHECK; SEED ESTABLISHMENT PERIOD; MAINTENANCE RECORD									X	X		AR									

SUBMITTAL REGISTER
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CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 03101

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3	MATERIALS	X									X		AR									
		1.3	SHOP DRAWINGS	X	X								X		AR									
		1.3	INSPECTIONS						X				X		AR									
		1.3	FORMWORK NOT SUPPORTING THE WEIGHT OF CONCRETE											X	AR									

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Garfield Avenue, Olyphant, PA

CONTRACTOR

SPECIFICATION SECTION
03150

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	CERTIFICATES k.	REPORTS l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CODE v.	CONTRACTOR ACTION: DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1.1	Premolded Expansion Joint Filler Strips						X					X											
			2.1.2.2	Compression Seals and Lubricant						X					X											
			2.1.2.1	Field Molded Sealants and Primer								X			X											

SUBMITTAL REGISTER
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CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 03210

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	FABRICATION & PLACEMENT											X	ED									
		1.2	MATERIALS						X					X	ED									
		1.2	MATERIALS									X	X		AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 03300

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.3, 1.7	MIXTURE PROPORTIONS (CONCRETE MIX DESIGN)	X				X	X	X		X		X	ED									
		1.3, 1.6.5,	CONCRETE TEMPERATURE CONTROL MEASURES	X		X			X					X	ED									
		1.3, 3.11	TESTING AND INSPECTION FOR CQC						X				X		AR									
		1.4	QUALITY CONTROL QUALIFICATIONS							X			X		AR									
		3.2.1	CONCRETE PLANT CERTIFICATION							X			X		AR									
		3.5.4	HOT WEATHER CONCRETE PLAN	X	X	X			X					X	ED									
		3.5.3	COLD WEATHER CONCRETE PLAN	X	X	X			X					X	ED									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 05055

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	DETAIL DRAWINGS		X									X	ED									
		1.2	MATERIALS ORDERS				X						X		AR									
		1.2	MATERIALS LISTS				X						X		AR									
		1.2	SHIPPING BILL				X						X		AR									
		1.2	WELDING FOR STRUCTURAL STEEL					X						X	AR									
		1.2	WELDING OF ALUMINUM					X		X				X	AR									
		1.2	WELDING REPAIRS					X						X	AR									
		1.2	TEST, INSPECTIONS & VERIFICATIONS						X				X		AR									
		1.2	QUALIFICATIONS OF WELDERS							X			X		AR									
		1.2	MATERIALS DISPOSITION									X	X		AR									

SUBMITTAL REGISTER
(ER 415-1-10)

CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 05502

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.2	SHOP FABRICATED METAL ITEMS		X									X	ED									
		1.2	MISCELLANEOUS METALS & STANDARD METAL ARTICLES				X							X	AR									
		1.2	MISCELLANEOUS METALS & STANDARD METAL ARTICLES						X					X	AR									
		1.2	MISCELLANEOUS METALS & STANDARD METAL ARTICLES								X		X		AR									
		1.2	MISCELLANEOUS METALS & STANDARD METAL ARTICLES									X	X		AR									

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CONTRACT NO.

TITLE AND LOCATION

GARFIELD AVENUE STORM WATER TRANSPORT SYSTEM, LACKAWANNA RIVER BASIN, OLYPHANT, PENNSYLVANIA

CONTRACTOR

SPECIFICATION SECTION 9940

				TYPE OF SUBMITTAL									CLASSI-FICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
TRANS-MITTAL NO. a.	ITEM NO. b.	SPECIFICATION PARAGRAPH NO. c.	DESCRIPTION OF ITEM SUBMITTED d.	DATA e.	DRAWINGS f.	INSTRUCTIONS g.	SCHEDULES h.	STATEMENTS i.	REPORTS j.	CERTIFICATES k.	SAMPLES l.	RECORDS m.	INFO ONLY n.	GOV. APPROVED o.	REVIEWER p.	SUBMIT q.	APPROVAL NEEDED BY r.	MATERIAL NEEDED BY s.	CODE t.	DATE u.	SUBMIT TO GOVERN-MENT v.	CODE w.	DATE x.	REMARKS y.
		1.4	WASTE CLASSIFICATION, HANDLING, AND DISPOSAL PLAN					X						X	AR									
		1.4	SPECIAL PAINT FORMULAS	X		X					X			X	ED									
		1.4	SPECIFICATION AND PROPRIETARY PAINTS	X		X					X			X	ED									
		1.4	THINNERS	X		X					X			X	AR									
		1.4	INSPECTIONS AND OPERATIONS									X		X	AR									

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on the reverse side prior to initiating this form)

DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL ____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

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 01351

SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW)

PART 1 GENERAL1.1 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 CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Threshold Limits	(2000) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z358.1	(1990) Emergency Eyewash and Shower Equipment

AMERICAN PETROLEUM INSTITUTE (API)

API Publ 2219	(1986) Safe Operation of Vacuum Trucks in Petroleum Service
API RP 1604	(1996) Closure Underground Petroleum Storage Tanks
API Std 2015	(1994) Safe Entry and Cleaning of Petroleum Storage Tanks

CODE OF FEDERAL REGULATIONS (CFR)

10 CFR 20	Standards for Protection Against Radiation
29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response

Information, and Training Requirements

ENGINEERING MANUALS (EM)

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

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 85-115	(1985) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

1.2 DESCRIPTION OF WORK

This section provides additional requirements for implementing the accident prevention provisions of EM 385-1-1, and specifies a Site Safety and Health Plan (SSHP) which shall satisfy the requirements for submission of a separate Accident Prevention Plan (APP) as required by EM 385-1-1. The requirements shall apply to work performed in both "contaminated" and "clean" areas.

1.3 SUBMITTALS

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

SD-04 Drawings

Work Zones; GA|AR.

Drawings shall include initial work zone boundaries: Exclusion Zone (EZ), including restricted and regulated areas; Contamination Reduction Zone (CRZ); and Support Zone (SZ).

Decontamination Facilities; FIO.

Drawings shall show the layout of the personnel and equipment decontamination areas.

SD-09 Reports

Monitoring/Sampling Results; FIO.

Personnel exposure monitoring/sampling results.

Site Control Log; FIO.

Record of each entry and exit into the site, as specified.

Site Safety and Health Plan; GA|AR.

Plan addressing safety and health during duration of the project.

1.4 REGULATORY REQUIREMENTS

Work performed under this contract shall comply with EM 385-1-1, applicable Federal, state, and local safety and occupational health laws and regulations. This includes, but is not limited to, Occupational Safety and Health Administration (OSHA) standards, 29 CFR 1910, especially Section .120, "Hazardous Waste Site Operations and Emergency Response" and 29 CFR 1926, especially Section .65, "Hazardous Waste Site Operations and Emergency Response". Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.5 SAFETY AND HEALTH PROGRAM

OSHA Standards 29 CFR 1910, Section .120 (b) and 29 CFR 1926, Section .65 (b) require employers to develop and implement a written Safety and Health Program for employees involved in hazardous waste operations. The site-specific program requirements of the OSHA Standards shall be integrated into one site-specific document, the Site Safety and Health Plan (SSHP). The SSHP shall interface with the employer's overall Safety and Health Program. Any portions of the overall Safety and Health Program that are referenced in the SSHP shall be included as appendices to the SSHP SSHP shall address topics such as qualifications of persons implementing HASP, COC's, on-site, and benzene as a potential contaminant.

1.6 SITE SAFETY AND HEALTH PLAN

1.6.1 Preparation and Implementation

A Site Safety and Health Plan (SSHP) shall be prepared covering onsite work to be performed by the Contractor and all subcontractors. The Safety and Health Manager shall be responsible for the development, implementation and oversight of the SSHP. The SSHP shall establish, in detail, the protocols necessary for the anticipation, recognition, evaluation, and control of hazards associated with each task performed. The SSHP shall address site-specific safety and health requirements and procedures based upon site-specific conditions. The level of detail provided in the SSHP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. Details about some activities may not be available when the initial SSHP is prepared and submitted. Therefore, the SSHP shall address, in as much detail as possible, anticipated tasks, their related hazards and anticipated control measures. Additional details shall be included in the activity hazard analyses as described in paragraph ACTIVITY HAZARD ANALYSES.

1.6.2 Acceptance and Modifications

Prior to submittal, the SSHP shall be signed and dated by the Safety and Health Manager and the Site Superintendent. The SSHP shall be submitted for review 30 days prior to the Preconstruction Safety Conference.

Deficiencies in the SSHP will be discussed at the preconstruction safety conference, and the SSHP shall be revised to correct the deficiencies and resubmitted for acceptance. Onsite work shall not begin until the plan has been accepted. A copy of the written SSHP shall be maintained onsite. As work proceeds, the SSHP shall be adapted to new situations and new conditions. Changes and modifications to the accepted SSHP shall be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Site Safety and Health Officer (SSHO) shall bring such hazard to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, necessary action shall be taken to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of this specification or the accepted SSHP shall be cause for stopping of work until the matter has been rectified.

1.6.3 Availability

The SSHP shall be made available in accordance with 29 CFR 1910, Section .120 (b)(1)(v) and 29 CFR 1926, Section .65 (b)(1)(v).

1.6.4 Elements

Topics required by 29 CFR 1910, Section .120 (b)(4) 29 CFR 1926, Section .65 (b)(4) and the Accident Prevention Plan as described in Appendix A of EM 385-1-1 and those described in this section shall be addressed in the SSHP. Where the use of a specific topic is not applicable to the project, the SSHP shall include a statement to justify its omission or reduced level of detail and establish that adequate consideration was given the topic.

1.7 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.7.1 Project/Site Conditions

The following information is a record of site contaminants and a description of the site. This information is provided to assist in preparing the SSHP. Additional sources of information are available as listed below.

1.7.1.1 Site Information

The potential contamination to the soil includes but is not limited to TPH's and PAH's.

1.7.2 Plan Requirements

The SSHP shall include a site description and contamination characterization section that addresses the following elements:

a. Description of site location, topography, size and past uses of the site.

b. A list of contaminants which may present occupational health and safety hazards. This list shall be created by evaluating the analytical results in this section and by researching sources of information from past site investigation activities. Chemical names, concentration ranges, media in which found, locations onsite, and estimated quantities/volumes to be impacted by site work shall be included if known. The contamination characterization shall be reviewed and revised if new chemicals are identified as work progresses.

1.8 HAZARD/RISK ANALYSIS

The SSHP shall include a safety and health hazard/risk analysis for each site task and operation to be performed. The hazard/risk analysis shall provide information necessary for determining safety and health procedures, equipment, and training to protect onsite personnel, the environment, and the public. Available site information shall be reviewed when preparing the "Hazard/Risk Analysis" section of the SSHP. The following elements, at a minimum, shall be addressed.

1.8.1 Site Tasks and Operations (Workplan)

The SSHP shall include a comprehensive section that addresses the tasks and objectives of the site operations and the logistics and resources required to reach those tasks and objectives. Based on the type of remediation required, the following is a list of anticipated major site tasks and operations to be performed: soil screening, sampling and the excavation, removal, replacement and disposal of site soil. This is not a complete list of site tasks and operations; therefore, it shall be expanded and/or revised, during preparation of the SSHP as necessary.

1.8.2 Hazards

The following potential hazards may be encountered during site work. These are not complete lists; therefore, they shall be expanded and/or revised as necessary during preparation of the SSHP.

1.8.2.1 Safety Hazards

Typically safety hazards include, but are not limited to, the following: tripping; noise; lifting, moving and rotating machinery; elevated, uneven or unstable work surfaces; fire; inclement weather; repetitive motion; ergonomic issues and utilities.

1.8.2.2 Chemical Hazards

Potential chemical hazards that may be encountered during site work are discussed in paragraph SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION. The Hazard/Risk Analysis section of the SSHP shall describe the chemical, physical, and toxicological properties of contaminants, sources and pathways of employee exposures, anticipated onsite and offsite exposure level potentials, and regulatory (including Federal, state, and local) or recommended protective exposure standards. The SSHP shall also address employee exposure to hazardous substances brought onsite, and shall comply with the requirements of 29 CFR 1910, Section .1200 and 29 CFR 1926,

Section .59, Hazard Communication. The Contractor shall determine the percentage of silica in construction related dust and evaluate worker exposure. A list of other potential contaminants shall be prepared and provided to the Contracting Officer.

1.8.2.3 Physical Agents

Physical agents that pose a threat to safety and health on-site include, but are not limited to, the following: noise; radiant heat and UV rays from the sun; cold weather; and possible electricity.

1.8.2.4 Biological Hazards

Biological hazards include poisonous plants; animals and disease-carrying organisms. The pathogens that carry Lyme Disease are carried by deer ticks.

1.8.3 Action Levels

1.8.3.1 General Requirements

Action levels shall be established for the situations listed below, at a minimum. The action levels and required actions (engineering controls, changes in PPE, etc.) shall be presented in the SSHP in both text and tabular form.

a. Implementation of engineering controls and work practices.

b. Upgrade or downgrade in level of personal protective equipment.

c. Work stoppage and/or emergency evacuation of onsite personnel.

d. Prevention and/or minimization of public exposures to hazards created by site activities.

1.8.3.2 Confined Space Entry

Entry into and work in a confined space will not be allowed when oxygen readings are less than 19.5% or greater than 23.5% or if the Lower Flammable Limit (LFL) reading is greater than 10%, unless these conditions are adequately addressed in the confined space entry program. In addition, action levels for toxic atmospheres shall be determined.

1.9 ACTIVITY HAZARD ANALYSES

Prior to beginning each major phase of work, an Activity Hazard Analysis shall be prepared by the Contractor performing that work and submitted for review and acceptance. The format shall be in accordance with EM 385-1-1, figure 1-1. A major phase of work 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. The analysis shall define the activities to be performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the activity hazard analysis has

been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the government onsite representatives. The activity hazard analyses shall be continuously reviewed and when appropriate modified to address changing site conditions or operations, with the concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Activity hazard analyses shall be attached to and become a part of the SSHP.

1.10 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

An organizational structure shall be developed that sets forth lines of authority (chain of command), responsibilities, and communication procedures concerning site safety, health, and emergency response. This organizational structure shall cover management, supervisors and employees of the Contractor and subcontractors. The structure shall include the means for coordinating and controlling work activities of subcontractors and suppliers. The SSHP shall include a description of this organizational structure as well as qualifications and responsibilities of each of the following individuals. The Contractor shall obtain Contracting Officer's acceptance before replacing any member of the Safety and Health Staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

1.10.1 Site Superintendent

A Site Superintendent, who has responsibility to implement the SSHP, the authority to direct work performed under this contract and verify compliance, shall be designated.

1.10.2 Safety and Health Manager

1.10.2.1 Qualifications

The services of an Industrial Hygienist certified by the American Board of Industrial Hygiene shall be utilized. The name, qualifications (education summary and documentation, ABIH certificate), and work experience summary shall be included in the SSHP. The Safety and Health Manager shall have the following additional qualifications:

a. A minimum of 3 years experience in developing and implementing safety and health programs at hazardous waste sites.

b. Documented experience in supervising professional and technician level personnel.

c. Documented experience in developing worker exposure assessment programs and air monitoring programs and techniques.

d. Documented experience in the development of personal protective equipment programs, including programs for working in and around potentially toxic, flammable and combustible atmospheres and confined spaces.

e. Working knowledge of state and Federal occupational safety and health regulations.

1.10.2.2 Responsibilities

The Safety and Health Manager shall:

a. Be responsible for the development, implementation, oversight, and enforcement of the SSHP.

b. Sign and date the SSHP prior to submittal.

c. Conduct initial site-specific training.

d. Be present onsite during the first 3 days of remedial activities and at the startup of each new major phase.

e. Visit the site as needed and at least once per month for the duration of activities, to audit the effectiveness of the SSHP.

f. Be available for emergencies.

g. Provide onsite consultation as needed to ensure the SSHP is fully implemented.

h. Coordinate any modifications to the SSHP with the Site Superintendent, the SSHO, and the Contracting Officer.

i. Provide continued support for upgrading/downgrading of the level of personal protection.

j. Be responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.

k. Review accident reports and results of daily inspections.

l. Serve as a member of the Contractor's quality control staff.

1.10.3 Site Safety and Health Officer (SSHO)

1.10.3.1 Qualifications of SSHO

An individual and one alternate shall be designated the Site Safety and Health Officer (SSHO). The name, qualifications (education and training summary and documentation), and work experience of the Site Safety and Health Officer and alternate shall be included in the SSHP. The SSHO shall have the following qualifications:

a. A minimum of 2 years experience in implementing safety and health programs at hazardous waste sites where Level B personal protective equipment was required.

b. Documented experience in construction techniques and construction safety procedures.

c. Working knowledge of Federal and state occupational safety and health regulations.

d. Specific training in personal and respiratory protective equipment program implementation, confined space program oversight, and in the proper use of air monitoring instruments, and air sampling methods including monitoring for ionizing radiation.

1.10.3.2 Responsibilities of SSHO

The Site Safety and Health Officer shall:

a. Assist and represent the Safety and Health Manager in onsite training and the day to day onsite implementation and enforcement of the accepted SSHP.

b. Be assigned to the site on a full time basis for the duration of field activities. The SSHO shall have no duties other than Safety and Health related duties. If operations are performed during more than 1 work shift per day, a site Safety and Health Officer shall be present for each shift and act as the radiation safety officer (RSO) as defined in paragraph 06.E.02 of EM 385-1-1 on radioactive waste cleanup projects.

c. Have authority to ensure site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the SSHP including, but not limited to, activity hazard analyses, air monitoring, monitoring for ionizing radiation, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log.

d. Have authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.

e. Consult with and coordinate any modifications to the SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.

f. Serve as a member of the Contractor's quality control staff on matters relating to safety and health.

g. Conduct accident investigations and prepare accident reports.

h. Review results of daily quality control inspections and document safety and health findings into the Daily Safety Inspection Log.

i. In coordination with site management and the Safety and Health Manager, recommend corrective actions for identified deficiencies and oversee the corrective actions.

1.10.4 Occupational Physician (OP)

1.10.4.1 Qualifications of OP

The services of a licensed physician, who is certified in occupational medicine by the American Board of Preventative Medicine, or who, by necessary training and experience is Board eligible, shall be utilized. The physician shall be familiar with this site's hazards and the scope of this project. The medical consultant's name, qualifications, and knowledge of the site's conditions and proposed activities shall be included in the SSHP.

1.10.4.2 Responsibilities of OP

The physician shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910, Section .120 (f) and 29 CFR 1926, Section .65 (f) and paragraph MEDICAL SURVEILLANCE.

1.10.5 Persons Certified in First Aid and CPR

At least two persons who are currently certified in first aid and CPR by the American Red Cross or other approved agency shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030. These persons may perform other duties but shall be immediately available to render first aid when needed.

1.10.6 Safety and Health Technicians

For each work crew in the exclusion zone, one person, designated as a Safety and Health technician, shall perform activities such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They shall have appropriate training equivalent to the SSHO in each specific area for which they have responsibility and shall report to and be under the supervision of the SSHO.

1.11 TRAINING

Personnel shall receive training in accordance with the Contractor's written safety and health training program and 29 CFR 1910 Section .120, 29 CFR 1926 Section .65, and 29 CFR 1926 Section .21. The SSHP shall include a section describing training requirements.

1.11.1 General Hazardous Waste Operations Training

Personnel entering the exclusion or contamination reduction zones shall have successfully completed 40 hours of hazardous waste instruction off the site; 3 days actual field experience under the direct supervision of a trained, experienced supervisor; and 8 hours refresher training annually. Onsite supervisors shall have completed the above training and 8 hours of additional, specialized training covering at least the following topics: the employer's safety and health program, personal protective equipment program, spill containment program, and health hazard monitoring procedures

and techniques. Copies of current training certification statements shall be submitted prior to initial entry onto the work site.

1.11.2 Site-specific Training

Site-specific training sessions shall be documented in accordance with Section 01.B.03.b of EM 385-1-1.

1.11.2.1 Initial Session (Pre-entry Briefing)

Prior to commencement of onsite field activities, all site employees, including those assigned only to the Support Zone, shall attend a site-specific safety and health training session of at least 4 hours duration. This session shall be conducted by the Safety and Health Manager and the Site Safety and Health Officer to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment. Procedures and contents of the accepted SSHP and Sections 01.B.02 and 28.D.03 of EM 385-1-1 shall be thoroughly discussed. The Contracting Officer shall be notified at least 5 days prior to the initial site-specific training session so government personnel involved in the project may attend.

1.11.2.2 Periodic Sessions

Periodic onsite training shall be conducted by the SSHO at least daily for personnel assigned to work at the site during the following week. The training shall address safety and health procedures, work practices, any changes in the SSHP, activity hazard analyses, work tasks, or schedule; results of previous week's air monitoring, review of safety discrepancies and accidents. Should an operational change affecting onsite field work be made, a meeting prior to implementation of the change shall be convened to explain safety and health procedures. Site-specific training sessions for new personnel, visitors, and suppliers shall be conducted by the SSHO using the training curriculum outlines developed by the Safety and Health Manager.

1.11.2.3 Other Training

Persons involved in any aspect of the transportation of hazardous materials shall be trained in accordance with 49 CFR 172 Subpart H..

1.12 PERSONAL PROTECTIVE EQUIPMENT

1.12.1 PPE Program

In accordance with 29 CFR 1910 Section .120 (g)(5) and 29 CFR 1926Section .65 (g)(5), a written Personal Protective Equipment (PPE) program which addresses the elements listed in that regulation, and which complies with respiratory protection program requirements of 29 CFR 1910 Section .134, is to be included in the employer's Safety and Health Program. The Site Safety and Health Plan shall detail the minimum PPE ensembles (including respirators) and specific materials from which the PPE components are constructed for each site-specific task and operation to be performed, based upon the hazard/risk analysis. Components of levels of protection (B, C, D and modifications) must be relevant to site-specific conditions,

including heat and cold stress potential and safety hazards. Only respirators approved by NIOSH shall be used. Onsite personnel shall be provided with appropriate personal protective equipment. Protective equipment and clothing shall be kept clean and well maintained. The PPE section of the SSHP shall include site-specific procedures to determine PPE program effectiveness and for onsite fit-testing of respirators, cleaning, maintenance, inspection, and storage of PPE.

1.12.2 Levels of Protection

The Safety and Health Manager shall establish appropriate levels of protection for each work activity based on review of historical site information, existing data, an evaluation of the potential for exposure (inhalation, dermal, ingestion, and injection) during each task, past air monitoring results, and a continuing safety and health monitoring program. The Safety and Health Manager shall also establish action levels for upgrade or downgrade in levels of PPE from the following specified minimum levels of protection. Protocols and the communication network for changing the level of protection shall be described in the SSHP. The PPE reassessment protocol shall address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, individual medical considerations, etc.

1.12.2.1 Components of Levels of Protection

The following items constitute minimum protective clothing and equipment ensembles to be utilized during this project:

Level D. Coverall
Boots/shoes, chemical resistant steel toe and shank
Optional equipment (disposable chemical resistant outer boots, safety glasses, chemical splash goggles, face shield, gloves, hard hat).

Modified Level D. Uncoated chemical resistant coveralls
Hard hat
Boots/shoes, chemical resistant steel toe and shank
Gloves
Safety glasses
Optional equipment (disposable chemical resistant outer boots, chemical splash goggles, face shield, hearing protection, inner and outer chemical resistant gloves, air purifying respirator).

Level C. Full face or half mask air purifying (NIOSH approved) respirator
Hooded coated chemical resistant (full body covering) clothing
Boots/shoes, chemical resistant steel toe and shank
Hard hat
Inner chemical resistant gloves
Outer chemical resistant gloves
0ptional equipment (disposable chemical resistant outer boots or boot covers, chemical splash goggles, face shield, escape mask, hearing protection).

Level B. Positive pressure, full face2iece self contained breathing

apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA (NIOSH approved)
Hooded coated chemical resistant (full body covering) clothing
Boots/shoes, chemical resistant steel toe and shank
Hard hat
Inner chemical resistant gloves
Outer chemical gloves resistant
Optional equipment (disposable chemical resistant outer boots or boot covers, chemical splash goggles, face shield, hearing protection).

1.12.2.2 Initial Minimum Levels of PPE by Task

Based on available information, the initial minimum protective equipment requirements for each major task and operation are listed below. Available site information shall be reviewed and the list of tasks and operations and these levels of protection shall be expanded and/or revised during preparation of the SSHP.

MINIMUM PROTECTIVE EQUIPMENT REQUIREMENTS

TASK/OPERATION	INITIAL LEVEL OF PROTECTION
Field Screening and Soil Sampling	Modified Level D
Soil Excavation	Modified Level D
Soil Removal	Modified Level D
Soil Replacement	Level D
Soil Disposal	Modified Level D

1.12.3 PPE for Government Personnel

Three clean sets of personal protective equipment and clothing (excluding air-purifying negative-pressure respirators and safety shoes, which will be provided by individual visitors), as required for entry into the Exclusion Zone and/or Contamination Reduction Zone, shall be available for use by the Contracting Officer or official visitors. The items shall be cleaned and maintained by the Contractor and stored in the contamination reduction zone and clearly marked: "FOR USE BY GOVERNMENT ONLY." The Contractor shall provide basic training in the use and limitations of the PPE provided, and institute administrative controls to check prerequisites prior to issuance. Such prerequisites include meeting minimum training requirements for the work tasks to be performed and medical clearance for site hazards and respirator use.

1.13 MEDICAL SURVEILLANCE

The Safety and Health Manager, in conjunction with the Occupational Physician, shall detail, in the employer's Safety and Health Program and the SSHP, the medical surveillance program that includes scheduling of

examinations, certification of fitness for duty, compliance with OSHA requirements, and information provided to the physician. Examinations shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place. Medical surveillance protocols and examination and test results shall be reviewed by the Occupational Physician. The medical surveillance program shall contain the requirements specified below. Personnel working in contaminated areas of the site shall have been examined as prescribed in 29 CFR 1910 Section .120, and 29 CFR 1926Section .65, and determined medically fit to perform their duties.

1.13.1 Frequency of Examinations

Employees shall have been provided with medical examinations as specified, within the past 12 months and shall receive exams annually thereafter (if contract duration exceeds 1 year); on termination of employment; reassignment in accordance with 29 CFR 1910 Section .120 (f)(3)(i), and 29 CFR 1926 Section .65 (f)(3)(i)(C); if the employee develops signs or symptoms of illness related to workplace exposures; if the physician determines examinations need to be conducted more often than once a year; and when an employee develops a lost time injury or illness during the period of this contract. The supervisor shall be provided with a written statement signed by the physician prior to allowing the employee to return to the work site after injury or illness resulting in a lost workday, as defined in 29 CFR 1904 Section .12 (f).

1.13.2 Content of Examinations

The following elements shall be included in the medical surveillance program. Additional elements may be included at the discretion of the occupational physician responsible for reviewing the medical surveillance protocols.

a. Complete medical and occupational history (initial exam only).

b. General physical examination of major organ systems.

c. Pulmonary function testing including FVC and FEV1.0.

d. CBC with differential.

e. Blood chemistry screening profile (e.g. SMAC 20/25).

f. Urinalysis with microscopic examination.

g. Audiometric testing (as required by Hearing Conservation Program).

h. Visual acuity.

i. Chest x-ray. (This test shall be performed no more frequently than every 4 years, unless directed by Occupational Physician.)

j. Electrocardiogram (as directed by Occupational Physician).

k. Urine heavy metals (arsenic, cadmium, chromium, and mercury).

l. serum lead.

m. zinc protoporphyrin.

1.13.3 Information Provided to the Occupational Physician

The physician shall be furnished with the following:

a. Site information from paragraph, SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION.

b. information on the employee's anticipated or measured exposure.

c. a description of any PPE used or to be used.

d. A description of the employee's duties as they relate to the employee's exposures (including physical demands on the employee and heat/cold stress).

e. A copy of 29 CFR 1910 Section .120, or 29 CFR 1926 Section .65.

f. Information from previous examinations not readily available to the examining physician.

g. A copy of Section 5.0 of NIOSH Pub No. 85-115.

h. Information required by 29 CFR 1910 Section .134.

1.13.4 Physician's Written Opinion

Before work begins a copy of the physician's written opinion for each employee shall be obtained and furnished to the Safety and Health Manager; and the employee. The opinion shall address the employee's ability to perform hazardous remediation work and shall contain the following:

a. The physician's recommended limitations upon the employee's assigned work and/or PPE usage.

b. The physician's opinion about increased risk to the employee's health resulting from work; and

c. A statement that the employee has been informed and advised about the results of the examination.

1.13.5 Medical Records

Documentation of medical exams shall be provided as part of the Certificate of Worker or Visitor Acknowledgment. Medical records shall be maintained in accordance with 29 CFR 1910 Section .120, and 29 CFR 1926Section .65.

1.14 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

The Safety and Health Manager shall prepare and implement an exposure monitoring/air sampling program to identify and quantify safety and health hazards and airborne levels of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment for affected site personnel. Available site information shall be reviewed and the exposure monitoring/air sampling program shall be expanded and/or revised for submittal as part of the SSHP. Minimum initial requirements for the program are delineated as follows:.

1.14.1 Location

Air monitoring/sampling will be necessary in all areas of the site (exclusion zone, contamination reduction zone) where intrusive activities in known or suspected contamination areas monitoring/sampling will be conducted in an uncontaminated area upwind of the site to determine background levels, during intrusive activities at the work interface, and in the breathing zones of the high risk employees.

1.14.2 Frequency and Duration

Background monitoring will be conducted at the beginning of each new phase of work and whenever a different exclusion zone is established. Air monitoring shall be conducted continuously (minimum every 30 minutes) at the interface of the intrusive activity. Explosive atmosphere monitoring shall be conducted continuously at the interface of the intrusive activity. Breathing zone monitoring shall be as necessary based on the results of intrusive activity monitoring.

1.14.3 Parameters

Parameters to be monitored include total organic vapors, particulate matter, combustible gases, oxygen and meteorologic data.

1.14.4 Methods/Instrumentation/Equipment

The following instrumentation and equipment at a minimum should be used to conduct air monitoring:

a. Portable photoionization detector or flame ionization detector.

b. Portable respirable dust monitor.

c. Colorimetric indicator tubes.

d. Combustible gas/oxygen meter.

e. Meteorological measurement equipment.

1.14.5 Evaluation, Required Action, Reporting and Documentation

Air monitoring results and implementation of appropriate actions taken based on action levels will be documented in the daily log. Documentation will include the following information: date, type of monitoring/samp;ing

equipment used, equipment I.D. or serial number, monitoring results for each work location or monitoring station with time of reading, analytical results for integrated sampling if used, personnel or location monitoring/sampled with description of activity being performed, sample numbers, weather conditions and miscellaneous information related to monitoring/sampling performed.

1.15 HEAT AND COLD STRESS MONITORING

The Safety and Health Manager shall develop a heat stress and cold stress monitoring program for onsite activities. Details of the monitoring program, including schedules for work and rest, and physiological monitoring requirements, shall be described in the SSHP. Personnel shall be trained to recognize the symptoms of heat and cold stress. The SSHO and an alternate person shall be designated, in writing, to be responsible for the heat and cold stress monitoring program.

1.15.1 Heat Stress

Physiological monitoring shall commence when the ambient temperature is above 70 degrees F. Monitoring frequency shall increase as the ambient temperature increases or as slow recovery rates are observed. An adequate supply of cool drinking water shall be provided for the workers. NIOSH Pub No. 85-115 may be consulted for guidance in determining protocols for prevention of heat stress.

1.15.2 Cold Stress

To guard against cold injury, appropriate clothing and warm shelter for rest periods shall be provided. Procedures to monitor and avoid cold stress shall be followed in accordance with the current TLVs for Cold Stress as recommended in ACGIH Threshold Limits.

1.16 SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

The SSHP shall describe the standard operating safety procedures, engineering controls and safe work practices to be implemented for the work covered. These shall include, but not be limited to, the following:

1.16.1 General Site Rules/Prohibitions

General site rules/prohibitions (buddy system, eating, drinking, and smoking restrictions, etc.).

1.16.2 Work Permit Requirements

Excavation, hot work, confined space, etc.

1.16.3 Material Handling Procedures

Soils, liquids.

1.16.3.1 Spill and Discharge Control

Written spill and discharge containment/control procedures shall be developed and implemented. These procedures shall address material handling equipment, and appropriate procedures for sampling, shipping and transport. These procedures shall describe prevention measures, such as building berms or dikes; spill control measures and material to be used (e.g. booms, vermiculite); location of the spill control material; personal protective equipment required to cleanup spills; disposal of contaminated material; and who is responsible to report the spill. Storage of contaminated material or hazardous materials shall be appropriately bermed, diked and/or contained to prevent any spillage of material on uncontaminated soil. If the spill or discharge is reportable, and/or human health or the environment are threatened, the National Response Center, the state, and the Contracting Officer shall be notified as soon as possible.

1.16.4 Drum and Container Handling

Procedures and Precautions (opening, sampling, overpacking).

1.16.5 Confined Space Entry Procedures

Personnel shall not be permitted to enter confined spaces without are part of this project at any time until the provisions of 29 CFR 1910.146 are safisfied.

1.17 SITE CONTROL MEASURES

In order to prevent the spread of contamination and control the flow of personnel, vehicles, and materials into and out of work areas, site control measures shall be established and described in the SSHP. The SSHP shall describe the methodology to be used by the Safety and Health Manager and SSHO in determining work zone designations and their modifications, and procedures to limit the spread of contamination. The SSHP shall include procedures for the implementation and enforcement of safety and health rules for all persons on the site, including employers, employees, outside Contractors, government representatives, and visitors.

1.17.1 Work Zones

Work zone boundaries (exclusion zone, including restricted and regulated areas; contamination reduction zone; and support zone) and access points shall be established and the boundary delineations shall be included on the drawings in the SSHP. Delineation of work zone boundaries shall be based on the contamination characterization data and the hazard/risk analysis to be performed as described in paragraph: HAZARD/RISK ANALYSIS. As work progresses and field conditions are monitored, work zone boundaries may be modified with approval of the Contracting Officer. Work zones shall be clearly identified and marked in the field (using fences, tape, signs, etc.). A site map, showing work zone boundaries and locations of decontamination facilities, shall be posted in the onsite office. Work zones shall consist of the following:

a. Exclusion Zone (EZ): The exclusion zone is the area where hazardous contamination is either known or expected to occur and the greatest potential for exposure exists. Entry into this area shall be

controlled and exit may only be made through the CRZ.

b. Contamination Reduction Zone (CRZ): The CRZ is the transition area between the Exclusion Zone and the Support Zone. The personnel and equipment decontamination areas shall be separate and unique areas located in the CRZ.

c. Support Zone (SZ): The Support Zone is defined as areas of the site, other than exclusion zones and contamination reduction zones, where workers do not have the potential to be exposed to hazardous substances or dangerous conditions resulting from hazardous waste operations. The Support Zone shall be secured against active or passive contamination. Site offices, parking areas, and other support facilities shall be located in the Support Zone.

1.17.2 Site Control Log

A log of personnel visiting, entering, or working on the site shall be maintained. The log shall include the following: date, name, agency or company, time entering and exiting site, time entering and exiting the exclusion zone (if applicable), and personal protective equipment utilized. Before visitors are allowed to enter the Contamination Reduction Zone or Exclusion Zone, they shall show proof of current training, medical surveillance and respirator fit testing (if respirators are required for the tasks to be performed) and shall fill out the Certificate of Worker or Visitor Acknowledgment. This visitor information, including date, shall be recorded in the log.

1.17.3 Communication

An employee alarm system that has adequate means of on and off site communication shall be provided and installed in accordance with 29 CFR 1910 Section .165. The means of communication shall be able to be perceived above ambient noise or light levels by employees in the affected portions of the workplace. The signals shall be distinctive and recognizable as messages to evacuate or to perform critical operations. This includes: Telephones, radios, airhorns, handsignals, etc.

1.17.4 Site Security

Signs shall be printed in bold large letters on contrasting backgrounds in English and/or where appropriate, in the predominant language of workers unable to read English. Signs shall be visible from all points where entry might occur and at such distances from the restricted area that employees may read the signs and take necessary protective steps before entering.

1.18 PERSONAL HYGIENE AND DECONTAMINATION

Personnel entering the Exclusion or Contamination Reduction Zones or otherwise exposed or subject to exposure to hazardous chemical vapors, liquids, or contaminated solids shall adhere to the following personal hygiene and decontamination provisions. Decontamination shall be performed in the CRZ prior to entering the Support Zone from the Exclusion Zone. Chapter 10.0 of NIOSH Pub No. 85-115 shall be consulted when preparing

decontamination procedures. A detailed discussion of personal hygiene and decontamination facilities and procedures to be followed by site workers shall be submitted as part of the SSHP. Employees shall be trained in the procedures and the procedures shall be enforced throughout site operations. Persons disregarding these provisions of the SSHP shall be barred from the site.

1.18.1 Decontamination Facilities

The following facilities shall be provided: 1) A personnel decontamination facility in the CRZ. This facility shall be used by both Contractor personnel and government representatives. The decontamination facility shall provide for separation of contaminated PPE and shall be equipped with soap in sufficient quantities for all anticipated personnel, and waste water storage facilities for controlling the disposal of used water. PPE and other disposible clothing shall be tested for contamination. If contaminated, clothing shall be disposed of.

1.18.2 Procedures

Minimum decontamination procedures will be listed in the SSHP. Available site information shall be reviewed and these procedures shall be expanded and/or revised for submittal as part of the SSHP.

1.19 EQUIPMENT DECONTAMINATION

Vehicles and equipment used in the EZ shall be decontaminated in the CRZ prior to leaving the site. The procedures for decontamination of vehicles and equipment shall be addressed in the SSHP.

1.19.1 Decontamination Facilities

A vehicle/equipment decontamination station shall be provided within the CRZ for decontaminating vehicles and equipment leaving the EZ. The decontamination station shall be as shown on the drawings. The decontamiation station pad shall be constructed to capture decontamination water, including overspray, and shall allow for collection and removal of the decontamination water using sumps, dikes and ditches as required. Equipment within the EZ or CRZ shall be decontaminated before maintenance is performed.

1.19.2 Procedures

Procedures for equipment decontamination shall be developed and utilized to prevent the spread of contamination into the SZ and offsite areas. These procedures shall address disposal of contaminated products and spent materials used on the site, including containers, fluids, oils, etc. Any item taken into the EZ shall be assumed to be contaminated and shall be inspected and/or decontaminated before the item leaves the area. Vehicles, equipment, and materials shall be cleaned and decontaminated prior to leaving the site. Construction material shall be handled in such a way as to minimize the potential for contaminants being spread and/or carried offsite. Prior to exiting the site, vehicles and equipment shall be monitored to ensure the adequacy of decontamination.

1.20 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

The SSHP shall describe the emergency and first aid equipment to be available onsite. The following items, as a minimum, shall be maintained onsite and available for immediate use:

a. First aid equipment and supplies approved by the consulting physician.

b. Emergency eyewashes and showers which comply with ANSI Z358.1.

c. Emergency-use respirators. For rescue purposes, 2 positive pressure self-contained breathing apparatus (SCBA) shall be supplied. These shall be dedicated for emergency use only and maintained onsite in the Contamination Reduction Zone.

d. Fire extinguishers with a minimum rating of 20-ABC shall be provided at site facilities and in all vehicles and at any other site locations where flammable or combustible materials present a fire risk.

1.21 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

An Emergency Response Plan, that meets the requirements of 29 CFR 1910 Section .120 (l) and 29 CFR 1926 Section .65 (l), shall be developed and implemented as a section of the SSHP. In the event of any emergency associated with remedial action, the Contractor shall, without delay, alert all onsite employees that there is an emergency situation; take action to remove or otherwise minimize the cause of the emergency; alert the Contracting Officer; and institute measures necessary to prevent repetition of the conditions or actions leading to, or resulting in, the emergency. Employees that are required to respond to hazardous emergency situations shall be trained in how to respond to such expected emergencies. The plan shall be rehearsed regularly as part of the overall training program for site operations. The plan shall be reviewed periodically and revised as necessary to reflect new or changing site conditions or information. Copies of the accepted SSHP and revisions shall be provided to the affected local emergency response agencies. The following elements, as a minimum, shall be addressed in the plan:

a. Pre-emergency planning. The local emergency response agencies shall be contacted and met with during preparation of the Emergency Response Plan. Agencies to be contacted include local fire, police, and rescue authorities with jurisdiction and nearby medical facilities that may be utilized for emergency treatment of injured personnel. At these meetings, the agencies shall be notified of upcoming site activities and potential emergency situations. The response agencies' capabilities shall be ascertained and written response commitments obtained. The Contractor shall ensure the Emergency Response Plan for the site is compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and Federal agencies.

b. Personnel roles, lines of authority, communications for emergencies.

c. Emergency recognition and prevention.

d. Site topography, layout, and prevailing weather conditions.

e. Criteria and procedures for site evacuation (emergency alerting procedures, employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control).

f. Specific procedures for decontamination and medical treatment of injured personnel.

g. Route maps to nearest prenotified medical facility. Site-support vehicles shall be equipped with maps. At the beginning of project operations, drivers of the support vehicles shall become familiar with the emergency route and the travel time required.

h. Emergency alerting and response procedures including posted instructions and a list of names and telephone numbers of emergency contacts (physician, nearby medical facility, fire and police departments, ambulance service, Federal, state, and local environmental agencies; as well as Safety and Health Manager, the Site Superintendent, the Contracting Officer and/or their alternates).

i. Criteria for initiating community alert program, contacts, and responsibilities.

j. Procedures for reporting incidents to appropriate government agencies. In the event that an incident such as an explosion or fire, or a spill or release of toxic materials occurs during the course of the project, the appropriate government agencies shall be immediately notified. In addition, the Contracting Officer shall be verbally notified immediately and receive a written notification within 24 hours. The report shall include the following items:

(1) Name, organization, telephone number, and location of the Contractor.

(2) Name and title of the person(s) reporting.

(3) Date and time of the incident.

(4) Location of the incident, i.e., site location, facility name.

(5) Brief summary of the incident giving pertinent details including type of operation ongoing at the time of the incident.

(6) Cause of the incident, if known.

(7) Casualties (fatalities, disabling injuries).

(8) Details of any existing chemical hazard or contamination.

(9) Estimated property damage, if applicable.

(10) Nature of damage, effect on contract schedule.

(11) Action taken to ensure safety and security.

(12) Other damage or injuries sustained, public or private.

k. Procedures for critique of emergency responses and follow-up.

1.22 CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGEMENT

A copy of a Contractor-generated certificate of worker/visitor acknowledgement shall be completed and submitted for each visitor allowed to enter contamination reduction or exclusion zones, and for each employee, following the example certificate at the end of this section.

1.23 INSPECTIONS

The SSHO shall perform daily inspections of the jobsite and the work in progress to ensure compliance with EM 385-1-1, the Safety and Health Program, the SSHP and other occupational health and safety requirements of the contract, and to determine the effectiveness of the SSHP. Procedures for correcting deficiencies (including actions, timetable and responsibilities) shall be described in the SSHP. Follow-up inspections to ensure correction of deficiencies shall be conducted and documented. Daily safety inspection logs shall be used to document the inspections, noting safety and health deficiencies, deficiencies in the effectiveness of the SSHP, and corrective actions taken. The SSHO's Daily Inspection Logs shall be attached to and submitted with the Daily Quality Control reports. Each entry shall include the following: date, work area checked, employees present in work area, PPE and work equipment being used in each area, special safety and health issues and notes, and signature of preparer. In the event of an accident, the Contracting Officer shall be notified according to EM 385-1-1. Within 2 working days of any reportable accident, an Accident Report shall be completed on ENG Form 3394 and submitted.

1.24 SAFETY AND HEALTH PHASE-OUT REPORT

A Safety and Health Phase-Out Report shall be submitted within 10working days following completion of the work, prior to final acceptance of the work. The following minimum information shall be included:

a. Summary of the overall performance of safety and health (accidents or incidents including near misses, unusual events, lessons learned, etc.).

b. Final decontamination documentation including procedures and techniques used to decontaminate equipment, vehicles, and on site facilities.

c. Summary of exposure monitoring and air sampling accomplished during the project.

d. Signatures of Safety and Health Manager and SSHO.

EXAMPLE CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGMENT

PROJECT NAME CONTRACT NO.
PROJECT ADDRESS
CONTRACTOR'S NAME
EMPLOYEE'S NAME

The contract for the above project requires the following: that you be provided with and complete formal and site-specific training; that you be supplied with proper personal protective equipment including respirators; that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you.

I HAVE READ, UNDERSTAND AND AGREE TO FOLLOW THE SITE SAFETY AND HEALTH PLAN FOR THIS SITE.

Name Date

--- ---

FORMAL TRAINING: I have completed the following formal training courses that meet OSHA's requirements:

Date Completed

40 hour: ....._____
8 hour supervisory:....._____
8 hour refresher:....._____

SITE-SPECIFIC TRAINING: I have been provided and have completed the site-specific training required by this Contract. The Site Safety and Health Officer conducted the training. _____

RESPIRATORY PROTECTION: I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair policy. _____

RESPIRATOR FIT-TEST TRAINING: I have been trained in the proper selection, fit, use, care, cleaning, and maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time._____

MEDICAL EXAMINATION: I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests and may have included an evaluation of a chest ax-ray. A physician made determination regarding my physical capacity to perform work tasks on the project while wearing protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's industrial hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

were no limitations to performing the required work tasks;

were identified physical limitations to performing the required work tasks.

Date medical exam completed

Employee's Signature _____
Date _____

Printed Name _____

Social Security Number _____

Contractor's Site Safety and Health Officer Signature _____

Date _____

Printed Name _____

Social Security Number _____

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01450

CHEMICAL DATA QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

CODE OF FEDERAL REGULATIONS (CFR)

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

U.S. ARMY CORPS OF ENGINEER MANUAL (EM)

EM 200-1-1	(1994) Validation of Analytical Chemistry Laboratories
EM 200-1-3	(1994) Requirements for the Preparation of Sampling and Analysis Plans Ch 1
EM 200-1-6	(1997) Chemical Quality Assurance

U.S. ARMY CORPS OF ENGINEERS

ER 1110-1-263	(1998) Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	(Rev O; updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II)

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (PADEP) BUREAU OF LAND RECYCLING AND WASTE MANAGEMENT

PADEP 258-2182-773 (April 2004) Management of Fill Document No. 258-2182-773

1.2 ACRONYMS

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

1.3 MEASUREMENT AND PAYMENT

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

1.4 CHEMISTRY REQUIREMENTS

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

1.4.1 Site History

The selected protection plan for the Lackawanna River Local Flood Protection Project at Olyphant, Pennsylvania includes the construction of levees, floodwalls, and interior drainage facilities. Based on a performed Preliminary Assessment, locations were selected for a preliminary site investigation. Construction of the Lackawanna Valley Local Flood Protection Project is expected to result in the disturbance and exposure of subsurface soils that are potentially contaminated by hazardous and toxic substances. The objective of the preliminary site investigation was to identify those areas within the construction limits of the proposed flood protection, which, due to the confirmed presence of contamination, will impact planned construction activities. Site condition data at the end of Section 01050, JOB CONDITIONS, presents the results of that preliminary site investigation.

1.4.2 Data Quality Objectives (DQO)

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

1.4.3 Sampling, Analysis and Measurement

1.4.3.1 Soil Samples

Soil samples shall be collected and analyzed and/or shipped to a primary laboratory in accordance with PADEP 258-2182-773. TPH has been identified in the following reaches of the project: Stations 0+00 to 2+70.

1.4.3.2 Manifesting Samples (if applicable)

Material shipping manifesting shall be in accordance with 40 CFR 261, 40 CFR 262, 40 CFR 268, 49 CFR 172, and 49 CFR 178. Manifesting samples shall be collected and analyzed according to the following table: per TSDF facility requirements.

1.4.4 Construction Areas

a. Soils along designated reaches identified as potentially contaminated with TPH shall be managed in accordance with PADEP fill policy as written in PADEP 258-2182-773. Adequate lead time should be allowed to receive results back from the chemistry laboratory in order to not delay excavation activities and not to slow work in those areas.

b. Samples are to be collected in accordance with PADEP 258-2182-773, Appendix A, within the identified reaches. Samples are to be sent to an analytical chemistry laboratory for a rapid turn around time on the analyses. The selected laboratory shall be USACE validated. If the soil samples contain levels exceeding limits set in PADEP 258-2182-773 for use as clean fill, the soil shall be temporarily stored in roll-off containers for proper management.

1.5 QUALITY ASSURANCE ELEMENTS

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

1.5.1 Laboratory Validation Requirements

The Contractor shall propose the minimum number of laboratories that can attain or have attained U.S. Army Corps of Engineers (USACE) validation in accordance with EM 200-1-1 and consistent with contract required chemical data quality. The Contractor may propose laboratories that shall subsequently be validated by the USACE, or select currently validated USACE laboratories. The Contractor shall identify all proposed project laboratories in the sampling and analysis plan (SAP). If a proposed analytical laboratory cannot meet specified analytical requirements or achieve the required validation, the Contractor shall select another laboratory. If not currently validated, the USACE laboratory validation process requires a nominal 120 day process.

1.6 SUBMITTALS

Government approval is required for submittals with a "GA" designation;

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

SD-01 Data

Sampling and Analysis Plan; GA.

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

SD-09 Reports

Quality Assurance Sample Collection and Analysis; FIO.

The QA Laboratory Advance Notification (QALAN); it shall be provided to the QA laboratory at least 10 business days before the initial shipment of samples.

Chemistry Data Package; FIO.

The chemistry data package with primary samples corresponding to the QA split samples shall be provided to the QA labfor each sample batch which has QA splits collected, as soon as the lab data is verified and released for reporting. Upon completion of the analysis of that sample batch which has primary samples corresponding to the QA splits taken the full chemistry data package will be part of the chemical data final report.

Chemical Data Final Report; GA.

The CDFR, within 30 days of completing work at the site, before final payment. Each report shall be labeled with the contract number, project name and location.

1.7 QUALIFICATIONS

1.7.1 Chemical Quality Control Officer

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

1.7.2 Project Chemist

As a minimum, the Contractor's Senior Chemist shall have: a BS degree in Chemistry; 2 years of experience related to investigations, studies, design and remedial actions at HTRW sites; 2 field seasons experience in calibrating and operating various field monitoring devices; and 1 year of experience in the operation of an HTRW commercial laboratory with standard analytical chemistry methods common for analyzing soil, water, air and other materials for chemical contamination assessment, including data for hazardous waste manifesting. The project chemist shall ensure that all chemistry related goals of the program are attained. The project chemist shall be available for consultation with Government personnel.

1.7.3 Environmental Sampler

As a minimum, the Contractor's Environmental Sampler shall have: a AA degree in Chemistry, Environmental Science, Engineering, Geology, Hydrology, or a related field; 2 years of experience in the development and preparation of SAP and work plans; 1 year of experience in and knowledge of EPA methods for collecting environmental and hazardous waste samples; 1 year of experience in operation of field screening equipment (e.g. PID, FID, infrared spectrometer, immunoassay, etc.); and 2 field seasons of experience with the particular field screening techniques for use on this project. The Environmental Sampler shall collect all onsite samples and perform all field screening tests. The Environmental Sampler shall review the sampling results, and provide recommendations for the Contractor's sampling program. The Environmental Sampler shall be onsite during all excavation and stockpiling operations involving contaminated soil or soil to be checked for contamination.

1.8 COORDINATION MEETING

After the preconstruction conference, before any sampling or testing, the Contractor and the Contracting Officer will meet at the construction site to discuss the CQC Plan and the SAP. The coordination meeting will be simultaneous to any CQC coordination meeting required in Section 01451 CONTRACTOR QUALITY CONTROL unless otherwise indicated or directed. A list of definable features that involve chemical measurements shall be agreed upon. At a minimum, each matrix (soil, instrumental chemical parameter measurement, etc.) shall be a definable work feature. Management of the chemical data quality system including project DQO, project submittals, chemical data documentation, chemical data assessment, required sampling and analysis protocols, and minimum data reporting requirements shall be agreed upon. The meeting will serve to establish an interrelationship between the Contractor's chemical data quality management and Government chemical quality assurance requirements. Minutes of the meeting will be documented by the Government and shall be signed by both the Contractor and the Contracting Officer. The minutes will include any or all unresolved chemical issues along with the conditions for resolution and will become a part of the contract file.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor shall be responsible for chemical sample acquisition, sample analysis, instrumental measurements of chemical parameters and for chemical data quality control. An effective chemical data quality control system shall be established that meets the requirements for the chemical measurement DQO applicable to the project. The system shall cover chemical measurements pertaining to and required for Contractor and subcontractor produced chemical data. The Contractor shall control field screening, sampling, and testing in conjunction with remedial activities to meet all DQO; minimize the amount of excavated material requiring temporary storage; prevent dilution of contaminated soils with clean soils; and ensure completion of work within the required time.

3.2 QUALITY CONTROL PLAN

3.2.1 General

In addition to the quality control requirements specified in Section 01451 CONTRACTOR QUALITY CONTROL, the CQC Plan shall incorporate the qualifications, authority and responsibilities of all chemical quality management and support personnel. Chemical measurements including sampling and/or chemical parameter measurement will not be permitted to begin until after production and acceptance of the CQC Plan, and Government approval of the SAP.

3.2.2 Chemistry Elements of the CQC Plan

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

3.2.2.1 Qualifications

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

3.2.2.2 Authority and Responsibility

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

3.3 SAMPLING AND ANALYSIS PLAN

The SAP shall be prepared in accordance with CDQC requirements and EM 200-1-3. The SAP shall be a two-part document that contains two distinct elements: FSP and QAPP. Sections of the FSP and QAPP shall not be cross referenced. The SAP shall confirm the Contractor's understanding of the contract requirements for chemical data quality control, and shall describe procedures for field sampling and sample submittal for analysis, field chemical parameter measurement, data documentation, data assessment and data reporting requirements. The SAP shall delineate the methods the Contractor intends to use to accomplish the chemical quality control items to assure accurate, precise, representative, complete, legally defensible and comparable data. The SAP shall describe all chemical parameter measurements for all matrices for all phases of the remediation contract. As a single interrelated document, the SAP shall be provided to field and laboratory personnel. The Contractor may propose original/innovative approaches to chemical parameter measurements for cost reduction and remediation efficiency by abbreviated sampling, contingency sampling and/or contingency analysis, onsite analytical services, equivalency or screening methods. The SAP shall clearly identify the Contractor obtained laboratories. The Contractor shall furnish copies of the Government approved SAP to all laboratories and the Contractor's field sampling crew. The SAP shall address all levels of the investigation with enough detail to become a document which may be used as an audit guide for field and laboratory work.

3.3.1 Field Sampling Plan

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

3.3.2 Quality Assurance Project Plan

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

3.4 CHEMISTRY DATA PACKAGE

The chemistry data package shall be produced and provided through USACE CO to the USACE QA lab and as an attachment to the CDFR. The chemistry data package shall contain information to demonstrate that the project's DQO have been fulfilled. The QA function will compare QA sample results to corresponding primary sample results, will assess the Contractor's

compliance with the SAP, and will recommend corrective action as necessary.

3.5 CONTROL OF CHEMICAL DATA QUALITY

Contractor chemical data quality control shall ensure that a quality control program is in place that assures sampling and analytical activities and the resulting chemical parameter measurement data comply with the DQO and the requirements of the SAP. The Contractor shall utilize the three-phase control system that includes a preparatory, initial and follow-up phase for each definable feature of work. The Contractor's three-phase chemical data control process shall ensure that data reporting requirements are achieved and shall be implemented according to Section 01451 CONTRACTOR QUALITY CONTROL. The three-phase chemical data control process shall be combined with that under Section 01451 CONTRACTOR QUALITY CONTROL.

3.6 ANALYTICAL TESTING LABORATORIES

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

3.6.1 Laboratory Analytical Requirements

The Contractor shall provide the specified chemical analyses by the Contractor's laboratory. The Contractor shall provide chemical analyses to achieve the project DQO for all parameters specified by the methods. To give the USACE programs the greatest flexibility in the execution of its projects, the EPA SW-846 methods are generally the methods employed for the analytical testing of environmental samples. These methods are flexible and shall be adapted to individual project-specific requirements.The laboratory analysis shall be performed on a fast turn around basis to limit construction delays.

3.6.2 Laboratory Performance

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

3.7 CHEMICAL DATA FINAL REPORT

The CDFR shall be produced including a summary of quality control practices employed and all chemical parameter measurement activities after project completion. As a minimum, the CDFR shall contain the following:

a. Summary of project scope and description.

b. Summary of any deviations from the design chemical parameter measurement specifications.

c. Summary of chemical parameter measurements performed as contingent measurements.

d. Summary discussion of resulting data including achieving data reporting requirements.

e. Summary of achieving project specific DQO.

f. Presentation and evaluation of the data to include an overall assessment on the quality of the data for each method and matrix.

g. Internal QC data generated during the project, including tabular summaries correlating sample identifiers with all blank, matrix spikes, surrogates, duplicates, laboratory control samples, and batch identifiers.

h. A list of the affected sample results for each analyte (indexed by method and matrix) including the appropriate data qualifier flag (J, B, R, etc.), where sample results are negatively impacted by adverse quality control criteria. Each data qualifier flag will be defined.

i. Summary of field and laboratory oversight activities, providing a discussion of the reliability of the data, QC problems encountered, and a summary of the evaluation of data quality for each analysis and matrix as indicated by the laboratory QC data and any other relevant findings.

j. Conclusions and recommendations.

k. Appendices containing: (1) Chemistry data package, and (2) Results of the Chemical Quality Assurance Report (CQAR). The CQAR is a Government produced document achieved through the inspection and analysis of QA samples and corresponding project sample data. The CQAR will include review of all QC parameters such as holding times, detection limits, method blanks, surrogate recoveries, matrix spikes and duplicates, and inter-laboratory and intra-laboratory data comparisons.

3.8 DOCUMENTATION

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

3.9 NOTIFICATION OF NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected

noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice.

-- End of Section --

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1994a) 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	(1995b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

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

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

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 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 quality requirements specified in the contract. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

3.2 QUALITY CONTROL 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, test, 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. (Laboratory facilities will be approved by the Contracting Officer.) The Contractor shall include a copy of the 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.

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 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 3 years construction experience on construction similar to this contract or 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 no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following area: civil. This individual shall be directly employed by the prime Contractor; be responsible to the CQC System Manager; be physically present at the construction site during work on his/her area of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. This individuals shall have no other duties other than quality control.

Experience Matrix

Area	Qualifications
a. Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs

related experience

3.4.4 Additional Requirement

The Contractor's Quality Control System Manager (CQCSM) is required to successfully complete the Corps of Engineers Construction Quality Management Course (CECQMC). Successful completion of the CECQMC within ninety (90) calendar days after NTP is a mandatory requirement for the position of the Quality Control System Manager. Certification is good for five (5) years at which time retraining 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 CQCSM who shall then attend the next available course. The Construction Quality Management Course (CQMC) is a one day course and will be taught at least six (6) times per year. The CQMC is administered by the Maryland Chapter of the Associated General Contractors (AGC). The cost of the CQMC shall be borne by the Contractor and will be one hundred and thirty five dollars ($135.00) per attendee. For Additional information call the AGC at (410) 321-7870. The Contractor has ninety (90) calendar days from the NTP to attend the course. The Contractor shall contact the AGC upon award of the contract to make arrangements for attending 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 shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals 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.

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 USACE validated testing laboratory or establish a validated 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 $4500.00 for the cost for inspection of this lab by the Corps of Engineers. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

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

3.7.4 Furnishing or Transportation of Samples for Testing

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

Materials and Instrumentation Unit
Fort McHenry Yard
Baltimore, Maryland 21230

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

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a punch list 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 this inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The 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 thereof 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 this inspection. Additional Government personnel 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 should 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 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 72 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality

control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

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

-- End of Section --

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

CONSTRUCTION QUALITY CONTROL REPORT

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

SUPERINTENDENT:_____

TYPE OF WORKERS	NUMBER	TYPES OF CONSTRUCTION EQUIPMENT ON SITE	NUMBER

SUBCONTRACTORS

COMPANY	RESPONSIBILITY	FOREMAN	NO. OF WORKERS

TOTALS

NO. OF WORKERS TODAY	MANHOURS TODAY	MANHOURS FOR THIS PERIOD

CONTRACT MATERIALS AND EQUIPMENT DELIVERED TO SITE:

WEATHER:_____ SITE CONDITIONS:_____

DID A DELAY OR WORK STOPPAGE OCCUR TODAY? _____
IF YES, EXPLAIN.

HAS ANYTHING DEVELOPED IN THE WORK WHICH MAY LEAD TO A CHANGE OR FINDING OF FACT? _____ IF YES, EXPLAIN.

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

PREPARATORY INSPECTION:

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

HAVE ALL REQUIRED SUBMITTALS AND SAMPLES OF CONSTRUCTION BEEN APPROVED.

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

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

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

HAS A PHASE HAZARD ANALYSIS BEEN PERFORMED?

COMMENTS AND DEFICIENCIES NOTED AND CORRECTIVE ACTIONS TAKEN:

ALL INSTRUCTIONS RECEIVED FROM QA PERSONNEL AND ACTIONS TAKEN:

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

INITIAL INSPECTION:

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

FOLLOW-UP INSPECTION:

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

SIGNATURE:_____
QUALITY CONTROL REPRESENTATIVE/MANAGER

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

SIGNATURE:_____
CONTRACTOR'S APPROVED AUTHORIZED REPRESENTATIVE

SECTION 01510

TEMPORARY CONSTRUCTION ITEMS

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS

EP 310-1-6	U.S. Army Corps of Engineers Sign Standards Manual

1.2 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.

1.3 SUBMITTALS

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

SD-04 Drawings

Site Plan; GA|AR.

Site plan showing the Contractor's fenced areas as specified in this section.

1.4 PROJECT SIGN: (JUN 1994)

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 (this Engineering Pamphlet is available at http://www.hnd.usace.army.mil/techinfo/index.htm). 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)

1.5 SAFETY SIGN (JUN 1994)

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. (CENAB)

1.6 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 2 of the specifications. The temporary patch shall be maintained by the Contractor until he permanently repairs the opening as delineated in Division 2. (SUGG NO. 75-183)

1.7 HAUL AND ACCESS ROUTES

1.7.1 Access Route Narrative, Survey and Post Construction Restoration

After award of the contract, the Contractor shall submit to the Contracting Officer for approval, a narrative of the through town haul and access routes intended for use. Upon approval of the haul and access routes, the Contractor and the Contracting Officer shall jointly survey the existing road conditions. Photo coverage of designated locations along the proposed route may be required as specified in Section 01050 JOB CONDITIONS. Upon completion of the work, any street or city road used as a haul or access route shall be restored and/or rebuilt to the original condition. This work shall be subject to the approval of the Contracting officer at no additional cost to the Government.

1.7.2 Haul Road Construction

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. Approved haul roads on public or private property 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 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, constructed haul and access routes as designated by the Contracting Officer shall be removed at the expense of the Contractor. (CENAB)

1.8 SITE PLAN

The Contractor shall prepare a site plan showing fencing, the number of trailers to be used, avenues of ingress/egress to the fenced area and

details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.9 EMPLOYEE PARKING

Contractor employees shall park privately owned vehicles in the areas designated by the Contracting Officer. Designated sites are adjacent to the construction site or within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of local residents and businesses.

1.10 CONTRACTOR'S TEMPORARY FACILITIES

1.10.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities near the construction site at an area designated by the Contracting Officer. Local government office and warehouse facilities will not be available to the Contractor's personnel.

1.10.2 Storage Area

The Contractor shall construct a temporary 11 ft high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the military boundaries. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work.

1.10.3 Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will rejected as unacceptable and the Contractor will be directed to provide new trailers or maintain existing ones.

1.10.4 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established

roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.10.5 Security Provisions

Adequate approved outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office. If local personnel are not available to provide security checks, the Contractor may utilize private security personnel approved by the Contracting Officer.

1.10.6 Restoration of Storage Areas

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

1.11 PLANT COMMUNICATIONS (JAN 63)

Whenever the Contractor has the individual elements of his plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The facilities shall be made available for use by Government personnel. (CENAB)

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01561

ENVIRONMENTAL PROTECTION

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

SD-08 Statements

Facility Plan; GA|AR.

Location of storage and service facilities.

Temporary Plan; GA|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.

1.7 BURNING

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

1.8 DUST CONTROL

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

1.9 PROTECTION OF LAND RESOURCES

1.9.1 General

It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, the Contractor

shall confine his construction activities to areas defined by the plans and specifications or to be cleared for other operations. The following additional requirements are intended to supplement and clarify the requirements of the CONTRACT CLAUSES:

1.9.2 Protection of trees retained

1.9.2.1 Contractors Responsibility

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

1.9.2.2 Stockpiling

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

1.9.2.3 Storage

No toxic materials shall be stored within 100 feet (30 5 m) from the drip line of trees to be retained.

1.9.2.4 Confined Area

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

1.9.2.5 Tree Defacing

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

1.9.3 Restoration of landscape damage

Any trees or other landscape feature scarred or damaged by the Contractor's operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Contracting Officer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of. All scars made on trees, designated on the plans to remain, and all cuts for the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted. Where tree climbing is necessary, the use of climbing spurs will not be

permitted. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Contracting Officer, shall be immediately removed and replaced with a nursery-grown tree of the same species. Replacement trees shall measure no less than 2 inches in diameter at 6 inches above the ground level.

1.9.4 Location of Storage and Services Facilities

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

1.9.5 Temporary Excavation and Embankment

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

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 01720

AS-BUILT DRAWINGS - CADD

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

SD-01 Data

CADD Files; FIO.

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.

SD-04 Drawings

Progress Prints; GA|AR.

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

Final Prints; GA|AR.

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. 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" (5 mm) 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) 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 400dpi 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

Sheet Number: T-1
Plate: 1

FT. INDIANTOWN GAP PENNSYLVANIA

EQUIPMENT CONSENTRATION 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.				

ATTACHMENT 1

SECTION 02110

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 REFERENCES (Not Applicable)

1.2 SCOPE The work covered by this section consists of furnishing all labor and equipment and performing all work required for clearing, grubbing, disposal of all vegetation, trees, and stumps off-site, clearing and disposal of debris, trash, and materials resulting from clearing operations within the limits indicated on the drawings and/or specified hereinafter. The Contractor is advised of the necessity of clearing and grubbing along the existing 30” VCP half pipe to be cleaned, between S. Valley Avenue and the Lackawanna River, and other areas as necessary. The Contractor may use his best judgement and clear only those areas necessary for project construction.

1.3 DEFINITIONS

1.3.1 Clearing

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared.

1.3.2 Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas.

1.4 SUBMITTALS (Not Applicable)

1.5 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered in this section will be in conformance with SECTION 01270 MEASUREMENT AND PAYMENT.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CLEARING

Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches to the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the trunk of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction

operations by the erection of barriers or by such other means as the circumstances require. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work.

3.2 GRUBBING

Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.3 TREE REMOVAL OUTSIDE AREAS DESIGNATED FOR CLEARING AND GRUBBING

Where indicated or directed, trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 DISPOSAL OF MATERIALS

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, shall be disposed of outside the limits of Government-controlled land, except when otherwise approved in writing. Such permission will state the conditions covering the disposal of such products and will also state the areas in which they may be placed.

-- End of Section --

SECTION 02111

EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 5434	(1993) Guide for Field Logging of Subsurface Explorations of Soil and Rock

1.2 SURVEYS

Surveys shall be performed immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. The Contractor shall provide cross-sections on 25 foot intervals and at obvious break points for all excavated areas. Locations of confirmation samples shall also be surveyed. Surveys shall be performed in accordance with Section: 01270 MEASUREMENT AND PAYMENT.

1.3 MEASUREMENT AND PAYMENT

1.3.1 Measurement

Measurement for excavation shall be based on the actual number of cubic yards of contaminated material in-place, prior to excavation. Determination of the volume of contaminated material excavated shall be based on cross-sectional volume determination reflecting the differential between the original elevations of the top of the contaminated material and the final elevations after removal of the contaminated material.

1.3.2 Payment

1.3.2.1 Excavation and Transportation

Compensation for excavation of contaminated material will be paid as a unit cost. This unit cost shall include any other items incidental to excavation and handling not defined as having a specific unit cost.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation,

submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with SECTION 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Excavation and Handling Work Plan; GA.

Work Plan within 30 calender days after notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. The Contractor shall allow 30 calender days in the schedule for the Government's review. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:

a. Schedule of activities.

b. Method of excavation and equipment to be used.

c. Shoring or side-wall slopes proposed.

d. Sampling and analysis plan for areas identified to be contaminated with PAH compounds and lead.

e. Storage methods and locations for liquid and solid contaminated material.

f. OMITTED

g. Decontamination procedures.

h. Spill contingency plan.

SD-09 Reports

Surveys; GA.

Cross-sections and areas of excavation.

Sampling of Stored Material; GA. Compaction; GA. Chemical Testing; GA.

Test results.

Closure Report; GA.

Four copies of Closure Report within 14 calender days of work completion at the site.

1.5 REGULATORY REQUIREMENTS

1.5.1 Permits and Licenses

The Contractor shall obtain required federal, state, and local permits for

excavation and storage of contaminated material. Permits shall be obtained at no additional cost to the Government.

1.6 DESCRIPTION OF WORK

The work shall consist of excavation, handling and disposal of approximately 1,200 cubic yards of contaminated material. Chemical analysis of contaminated material has not been performed. Subsurface conditions are shown on the subsurface exploration logs. The Contractor shall perform an independent evaluation of the site characterization data. The Contracting Officer shall be notified within 48 hours if contaminated material is discovered which has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. Ground water at time of drilling is indicated on the drawings.

1.6.1 Potential Contamination

One reach has been identified with potential HTRW contamination. Petroleum Hydrocarbons were detected above the old interim PADEP regulatory limit of 500 ppm by borehole OL1-1 at Station 1+50, and borehole OL1-2 at Station 2+20, as delineated on pages SC-2 and SC-3 at the rear of Section 01050. This 500 ppm total petroleum hydrocarbon limit has been replaced by PA Act 2 cleanup standards and an April 2004 fill policy, which require testing for specific chemical constituents per hydrocarbon fraction. The total excavation quantity in the reach between stations 0+00 to 2+70 is approximately 2,410 cubic yards, which includes excavation for installation of the 72"pipe.

1.6.1.1 Petroleum Hydrocarbons

In those reaches identified to be potentially contaminated with petroleum hydrocarbons which may require excavation and disposal, it is estimated that the amount of material which will be possibly impacted by this should not be greater than 50% of the calculated volume within the 0+00 to 2+70 reach. Therefore the total volume for excavation impacted by petroleum hydrocarbon contaminants should not exceed 1,200 cubic yards.

1.6.1.2 Testing and Chemical Quality Assurance

Analytical testing and Chemical Data Quality Assurance requirements for PAH compounds and lead can be found in SECTION 01450 CHEMICAL DATA QUALITY CONTROL.

1.7 CHEMICAL TESTING

Required sampling and chemical analysis shall be conducted in accordance with Section 01450 CHEMICAL DATA QUALITY CONTROL.

1.8 SCHEDULING

The Contractor shall notify the Contracting Officer 30 calender days prior to the start of excavation of contaminated material. The Contractor shall be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

PART 2 PRODUCTS

2.1 BACKFILL MATERIAL

Backfill will be in accordance with Section 02210 EMBANKMENT.

2.2 SPILL RESPONSE MATERIALS

The Contractor shall provide spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times in which hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

PART 3 EXECUTION

3.1 EXISTING STRUCTURES AND UTILITIES

No excavation shall be performed until site utilities have been field located. The Contractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Government. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without written approval from the Contracting Officer.

3.2 CONTAMINATED MATERIAL REMOVAL

Sampling of soils in potentially contaminated areas will be performed in accordance with excavations to be done in those areas. Adequate lead time should be allowed to receive results back form the laboratory in order not to delay excavation activities and not slow work. Suspected contaminant is TPH.

3.2.1 Excavation

Areas of contamination shall be excavated to the depth and extent necessary for project construction or as directed by the Contracting Officer. Excavation shall be performed in a manner that will limit the potential for contaminated material to be mixed with uncontaminated material. The Contractor shall maintain an excavation of sufficient size to allow workers ample room to complete the work. A log of the materials and any visible signs of contamination encountered during excavation shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D 5434.

3.2.2 Dewatering

Surface water shall be diverted to prevent entry into the excavation.

3.3 CONFIRMATION

The Contracting Officer shall be present to inspect the removal of contaminated material from each site. Additional excavation should only be made for geotechnical purposes (i.e., unsuitable foundation).

3.4 CONTAMINATED MATERIAL STORAGE

Material shall be placed in temporary storage immediately after excavation. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.

3.4.1 Roll-Off Units

Water-tight roll-off units shall be used to temporarily store contaminated material. An impermeable cover shall be placed over the units to prevent precipitation from contacting the stored material. Liquid which collects inside the units shall be removed and stored in accordance with paragraph Liquid Storage.

3.4.2 Liquid Storage

Liquid collected from excavations and stockpiles shall be temporarily stored in 55 gallon barrels. Liquid storage containers shall be water-tight.

3.5 SAMPLING

3.5.1 Sampling of Stored Material

Soil shall be sampled in accordance with PADEP 258-2182-773.

3.6 BACKFILL

3.6.1 Confirmation Test Results

Excavations shall be backfilled as soon as possible after all contaminated materials have been removed.

3.6.2 Compaction

Compaction shall be accomplished in accordance with Section 02210 EMBANKMENT.

3.7 DISPOSAL REQUIREMENTS

Offsite disposal of contaminated material shall be in accordance with Section 02120 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.8 COPIES OF DISPOSAL DOCUMENTATION

Four copies of a material handling report shall be prepared and submitted within 21 calender days of completing work at the site. The documentation shall be labeled with the contract number, project name, location, date, name of general contractor, and the Corps of Engineers District contracting for the work.The disposal documents shall include:

a. A cover letter signed by a responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents.

b. A narrative report including, but not limited to, the following:

(1) OMITTED

(2) OMITTED

(3) OMITTED

(4) quantity of materials removed from each area of contamination;

(5) OMITTED

(6) sampling locations and sampling methods;

(7) collection data such as time of collection and method of preservation;

(8) sample chain-of-custody forms; and

c. Copies of all chemical and physical test results.

d. Copies of all manifests and land disposal restriction notifications.

e. Copies of all certifications of final disposal signed by the responsible disposal facility official.

f. Waste profile sheets.

g. Scaled drawings showing limits of each excavation, limits of contamination, known underground utilities within 50 feet of excavation, sample locations, and sample identification numbers.

h. Progress Photographs. Color photographs shall be used to document progress of the work. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before work begins. After work has been started, activities at each work location shall be photographically recorded daily.

Photographs shall be a minimum of 3 x 5 inches and shall include:

(1) Soil removal, handling, and sampling.

(2) Unanticipated events such as discovery of additional contaminated material.

(3) Contaminated material storage.

(4) Site or task-specific employee respiratory and personal protection.

(5) OMITTED

(6) Post-construction photographs. After completion of work at each site, the Contractor shall take a minimum of four views of each excavation site.

Photographs shall be mounted back-to-back in double face plastic sleeves punched to fit standard three ring binders. Each print shall have an information box attached. The box shall be typewritten and arranged as follows:

Project Name:	Direction of View:
Location:	Date/Time:
Photograph No.:	Description of View:

-- End of Section --

SECTION 02120
TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

PART 1 GENERAL

1.1 REFERENCES

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

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 761	Polychlorinated Biphenyls (PCBs)

	Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 SUBMITTALS

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

SD-1 Data

On-site Hazardous Waste Management; GA.
Off-site Hazardous Waste Management; GA.

Prior to start of work, a plan detailing the manner in which hazardous wastes shall be managed.

SD-09 Reports

Recordkeeping; GA.

Information necessary to file state annual or EPA biennial reports for all hazardous waste transported, treated, stored, or disposed of under this contract. The Contractor shall not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. The submittal shall contain all the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter shall accompany the data to include the contract number, Contractor name, and project location.

Spill Response; FIO.

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), the Contractor shall notify the Contracting Officer immediately. If the spill exceeds a reporting threshold, the Contractor shall follow the pre-established procedures for immediate reporting to the Contracting Officer.

Exception Reports; GA.

In the event that a manifest copy documenting receipt of hazardous waste at the treatment, storage, and disposal facility is not received within 35 days of shipment initiation, the Contractor shall prepare and submit an exception report to the Contracting Officer within 37 days of shipment initiation.

SD-13 Certificates

Qualifications; FIO.

Copies of the current certificates of registration issued to the Contractor and/or subcontractors or written statements certifying exemption from these requirements.

Off-Site Policy Compliance Certification; FIO.

A letter certifying that EPA considers the facilities to be used for all off-site disposal to be acceptable in accordance with the Off-Site policy in 40 CFR 300, Section .440. This certification shall be provided for wastes from Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 et seq., sites as well as from Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq., responses. See Attachment A sample certification at the end of this section.

Certificates of Disposal; FIO.

Certificates documenting the ultimate disposal of hazardous wastes, within 180 days of initial shipment. Receipt of these certificates will be required for final payment.

Packagings Certification; GA.

All transportation related shipping documents to the Contracting Officer , including draft land disposal restriction notifications, draft bill of ladings for hazardous materials, lists of corresponding proposed labels, packages, marks, and placards to be used for shipment, waste profiles, supporting waste analysis documents, for review a minimum of 14 days prior to anticipated pickup. Packaging assurances shall be furnished prior to transporting hazardous material; shall be furnished when shipments are originated; and "receipt copies" of asbestos waste shipment records at the designated disposal facility shall be furnished not later than 35 days after acceptance of the shipment.

SD-18 Records

Notices of Non-Compliance and Notices of Violation; FIO.

Notices of non-compliance or notices of violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. The Contractor shall immediately provide copies of such notices to the Contracting Officer. The Contractor shall also furnish all relevant documents regarding the incident and any information requested by the Contracting Officer, and shall coordinate its response to the notice with the Contracting Officer or his designated

representative prior to submission to the notifying authority. The Contractor shall also furnish a copy to the Contracting Officer of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

1.3 QUALIFICATIONS

1.3.1 Transportation and Disposal Coordinator

The Contractor shall designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC shall serve as the single point of contact for all environmental regulatory matters and shall have overall responsibility for total environmental compliance at the site including but not limited to accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC shall have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste.

1.3.2 Training

The Contractor's hazardous materials employees shall be trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01110 SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW/UST). The Contractor's employees transporting hazardous materials or preparing hazardous materials for transportation shall be trained, tested, and certified in accordance with 49 CFR 172.

1.3.3 Certification

The Contractor and/or subcontractors transporting hazardous materials shall possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G.

1.4 LAWS AND REGULATIONS REQUIREMENTS

Work shall meet or exceed the minimum requirements established by Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and the Contractor shall be responsible for complying with amendments as they become effective. In the event that compliance exceeds the scope of work or conflicts with specific requirements of the contract, the Contractor shall notify the Contracting Officer immediately.

1.5 DEFINITIONS

a. Hazardous Material. A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant

to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

b. Hazardous Waste. A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

PART 2 PRODUCTS

2.1 MATERIALS

The Contractor shall provide all of the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards. Details in this specification shall not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

The Contractor shall provide bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging shall meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Each packaging shall conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and shall be compatible with the material to be packaged as required by 40 CFR 262. The Contractor shall also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers, etc. Sorbent materials shall not be capable of reacting dangerously with, being decomposed by, or being ignited by the hazardous materials being packaged. Additionally, sorbents used to treat free liquids to be disposed of in landfills shall be non-biodegradable as specified in 40 CFR 264, Section .314.

2.1.2 Markings

The Contractor shall provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 262, Section .32 (for hazardous waste). Markings must be capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.3 Labeling

The Contractor shall provide primary and subsidiary labels for hazardous

materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels shall meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels shall be durable and weather resistant and capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.4 Placards

For each off-site shipment of hazardous material/waste, the Contractor shall provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Placards shall be provided for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30 day exposure to open weather conditions and shall meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

The Contractor shall provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials shall be available at all times in which hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

The Contractor shall provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 HAZARDOUS MATERIALS MANAGEMENT

The Contractor, in consultation with the Contracting Officer, shall evaluate prior to shipment of any material off-site whether the material is regulated as a hazardous waste in addition to being regulated as a hazardous material; this shall be done for the purpose of determining proper shipping descriptions, marking requirements, etcetera, as described below.

3.1.1 Identification of Proper Shipping Names

The Contractor shall use 49 CFR 172, Section .101 to identify proper shipping names for each hazardous material (including hazardous wastes) to be shipped off-site. Proper shipping names shall be submitted to the Contracting Officer in the form of draft shipping documents for review and approval.

3.1.2 Packaging, Labeling, and Marking

The Contractor shall package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations.

3.1.3 Shipping Documents

The Contractor shall ensure that each shipment of hazardous material sent off-site is accompanied by properly completed shipping documents.

3.1.3.1 Other Hazardous Material Shipment Documents

The Contractor shall prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest which fulfills the shipping paper requirements. The bill of lading shall satisfy the requirements of 49 CFR 172, Subpart C, and any applicable state or local law or regulation, and shall be submitted to the Contracting Officer for review and approval. For laboratory samples and treatability study samples, the Contractor shall prepare bills of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d) and (e) and any applicable state or local law or regulation. Bill of ladings requiring shipper's certifications shall be signed by the Contractor.

3.2 WASTE MINIMIZATION

The Contractor shall minimize the generation of hazardous waste to the maximum extent practicable. The Contractor shall take all necessary precautions to avoid mixing clean and contaminated wastes. The Contractor shall identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 shall apply to: hazardous wastes recycled in a manner constituting disposal.

3.3 RECORDKEEPING

The Contractor shall be responsible for maintaining adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports.

3.4 SPILL RESPONSE

The Contractor shall respond to any spill of hazardous materials or hazardous waste which are in the custody or care of the Contractor pursuant to this contract. Any direction from the Contracting Officer concerning a spill or release shall not be considered a change under the contract. The Contractor shall comply with all applicable requirements of Federal, state, or local laws or regulations regarding any spill incident.

3.5 EMERGENCY CONTACTS

The Contractor shall be responsible for complying with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, the Contractor shall provide a 24-hr emergency response contact and phone number of a person knowledgeable about the

hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. The phone must be monitored on a 24-hour basis at all times when the hazardous materials are in transportation including during storage incidental to transportation. The Contractor shall ensure that information regarding this emergency contact and phone number are placed on all hazardous materials shipping documents. The Contractor shall designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted on a 24 hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

Attachment A

SAMPLE OFF-SITE POLICY CERTIFICATION MEMO

Project/Contract #:_____

Waste Stream:_____

Primary TSD Facility, EPA ID # and Location: _____

Alter. TSD Facility, EPA ID # and Location:_____

EPA Region	Primary Contact	Secondary Contact
I	(617) 573-5755	(617) 573-1754
II	(212) 264-9504	(212) 264-2638
III	(215) 597-1857	(215) 597-8338
IV	(404) 347-7603	(404) 347-7603
V	(312) 353-7921	(312) 886-4445
VI	(214) 655-2282	(214) 655-2281
VII	(913) 551-7816	(913) 551-7667
VIII	(303) 293-1823	(303) 293-1506
IX	(415) 744-2129	(415) 744-2114
X	(206) 553-6646	(206) 553-1061

EPA representative contacted: _____

EPA representative phone number: _____

Date contacted: _____

Comment: _____

The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.

Signature: _____ Date: _____

Phone number: _____

-- End of Section --

SECTION 02200

STRIPPING AND EXCAVATION

1. GENERAL: The work covered by this section consists of furnishing all labor, plant, equipment, and materials, and performing all operations in connection with stripping and excavation. It also includes all related work involving disposal of unsuitable materials, and all other work incidental to the stripping and excavation under this contract.

2. DEFINITIONS: Stripping and excavation shall consist of removal of material to the lines and grades shown on the drawings, or as otherwise directed or approved by the Contracting Officer. Stripping and excavation under this contract will be defined as specified herein and as indicated on the drawings and designated for payment as specified in SECTION 01270. The limits of all items of work will be as shown on the drawings or as defined herein.

2.1. STRIPPING: After inspection and approval of cleared areas, stripping may proceed. The stripping operation shall be performed to a depth of 12 inches on all areas to be excavated or to receive materials, except as noted on the drawings and otherwise specified herein.

2.2. EXCAVATION: Common excavation shall consist of all required excavation. Common excavation shall be unclassified and shall include the trench excavation, foundation soils, rockfill materials, excavation for structures, and other required excavations.

3. STRIPPING AND EXCAVATION FEATURES:

3.1. STRIPPING: All areas of required common excavation and areas to receive fill, unless otherwise noted on the drawings, or as otherwise directed by the Contracting Officer shall be stripped to a depth of 12 inches or to such additional depth as required to remove all organic material and topsoil. Material meeting the requirements specified for topsoil under SECTION 02921, SEEDING, shall be stockpiled for later use. Unsuitable stripped material shall be spoiled off site in an area provided by the Contractor. Stripping shall not greatly precede excavation or fill placement operations and no area shall be stripped until approved by the Contracting Officer.

3.2. EXCAVATION:

3.2.1. COMMON EXCAVATION: Materials classified as common excavation shall be excavated to the specified lines and grades as shown on the drawings unless otherwise directed by the Contracting Officer. The materials excavated from common excavation which meet the requirements for the select backfill or modified backfill zones, or any excavated material which could meet those requirements after processing, may be utilized. All other material shall be disposed of as stated in paragraph “DISPOSAL OF MATERIALS”. If any materials are removed beyond the lines and grades shown on the drawings, or as otherwise specified or approved by the

Contracting Officer, the Contractor will replace and compact material as necessary to reestablish, to the satisfaction of the Contracting Officer, the correct lines and grades. All excavations within 12 inches of concrete structures will be accomplished by hand methods.

3.2.2. COMMON EXCAVATION FOR STRUCTURES AND PIPES: Excavation for inlets, manholes, pipes, curbing, outlet headwall, or similar structures shall extend a sufficient distance (12 inch minimum) beyond the walls and footings to allow for placing and removal of forms for the full length and width of structure as shown on the drawings. Unsatisfactory material, as defined in Section 02316, encountered beyond the depths indicated shall be removed to the depths and lateral limits as directed and shall be replaced with appropriate backfill materials as approved by the Contracting Officer. Determination of elevation of approved over-depth excavations shall be done in the presence of the Contracting Officer. When concrete is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete is to be placed. When removal of unstable material is required due to the fault or neglect of the Contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.2.3. DRAINAGE AND DEWATERING FOR COMMON EXCAVATION:

3.2.3.1. DRAINAGE: Excavation shall be performed so that the site, and the area immediately surrounding the site and affecting operations at the site, will be continually and effectively drained. Water shall not be permitted to accumulate in the excavation. The excavation shall be drained by pumping or other satisfactory methods to prevent softening of the subgrade or other actions detrimental to proper construction procedures. Surface water shall be directed away from excavation and construction sites so as to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Drainage shall comply with the requirements of SECTION 01561, ENVIRONMENTAL PROTECTION.

3.2.3.2. DEWATERING: The Contractor shall be aware of the subsurface water levels recorded and the dates these levels were recorded on the boring logs provided at the end of SECTION 01050 of these specifications. These water levels are only for the dates shown on the logs and it can be expected that the water table may fluctuate. The Contractor shall also note the fluctuation of the Lackawanna River. Stream flow records are available from USGS. During construction, special care shall be taken to insure that excavations for foundations are accurate and no excavation for structures, which will be influenced by groundwater, shall be made to final grade until dewatering has been accomplished to the satisfaction of the Contracting Officer. Prior to installation, the Contractor shall submit his dewatering plan to the Contracting Officer for review. If dewatering is to be accomplished by means of pumping from a sump, the

sump shall be located at least 6 feet from the edge of the structure. The Contractor will be required to provide suitable protection to the sump pit walls and the excavated areas to insure that fine-grained soils are not removed during the pumping operations. The Contractor is responsible for draining or dewatering all areas of excavation to the extent and by the means necessary to allow for proper placement of fills and backfills. Dewatering methods shall be subject to the approval of the Contracting Officer. Water from dewatering operations shall not be discharged directly into the Lackawanna River.

3.2.3.3. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, ditches, or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Dewatering measures shall be implemented prior to the time the excavation reaches the anticipated water level in order to maintain the integrity of the in situ material.

3.2.4. SHORING: Shoring, shall be furnished and installed as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Shoring, bracing, and sheeting shall be removed as excavations are backfilled, in a manner to prevent caving. The shoring and bracing system must be designed by a Pennsylvania registered professional engineer having at least 5 years experience in the design of temporary sheeting and shoring systems. The sheeting and shoring plan must be submitted at least 30 days prior to installation, and installation shall not commence until approval of the submittal is given.

4. DISPOSAL OF MATERIALS: All noncombustible material from required excavation which is unsuitable for use as backfill shall be placed off-site in an area provided by the Contractor, at the expense and responsibility of the Contractor, unless otherwise approved by the Contracting Officer. Disposal of spoil material shall not be made without the permission of the property owners and the Contractor shall make all arrangements for disposal and furnish the Contracting Officer written evidence of the permission of the property owner. It will be the responsibility of the Contractor to obtain all necessary State and local requirements for transportation and spoiling of the material.

5. SLIDES: In the event of a slide in either embankment or excavation slopes, the Contractor shall notify the Contracting Officer immediately, halt all excavation and placement in the vicinity of the slide, and await further instructions.

6. PROTECTION OF EXISTING STRUCTURES AND UTILITIES: Prior to stripping and excavation activities, the Contractor shall verify the locations of all existing structures and utilities adjacent to and within the limits of work. It shall be the responsibility of the Contractor to protect all existing structures and utilities adjacent to the excavation by any means required to assure their integrity. Any structure or utility damaged by

the Contractor shall be repaired or replaced as determined by the Contracting Officer and at the Contractor's expense.

7. BORROW AREAS: In addition to the materials obtained from the required excavation, it shall be the responsibility of the Contractor to obtain backfill materials from approved off-site borrow sources. No separate measurement or payment will be made for borrow excavation.

8. MEASUREMENT AND PAYMENT: Measurement and payment for the work covered in this section shall conform with SECTION 01270: MEASUREMENT AND PAYMENT.

9. QUALITY CONTROL: The Contractor shall establish and maintain quality control as required by SECTION 01451: CONTRACTOR QUALITY CONTROL (CQC).

10. SUBMITTALS FOR GOVERNMENT APPROVAL: Submittals shall be in accordance with SECTION 01330, SUBMITTAL PROCEDURES.

---END OF SECTION---

SECTION 02216

GEOTEXTILE

1. SCOPE. The Contractor shall provide all labor, materials, tools, equipment, and incidentals necessary to install geotextile material, in accordance with the drawings and these specifications.

2. APPLICABLE PUBLICATIONS. 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.

2.1 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS.

D 123-88b	Standard Terminology Relating to Textiles Materials
D 1777-75	Measuring Thickness of Textile Materials
D 3776-90	Mass Per Unit Area (Weight) of Woven Fabric
D 3786-87	Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method
D 4355-84	Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
D 4491-85	Water Permeability of Geotextiles by Permittivity
D 4533-85	Trapezoidal Tearing Strength of Geotextiles
D 4632-86	Breaking Load and Elongation of Geotextiles (Grab Method)
D 4751-87	Determining the Apparent Opening Size of a Geotextile
D 4833-88	Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

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

4. DELIVERY, STORAGE AND HANDLING. Geotextile materials shall be delivered only after the required submittals have been received and approved by the Contracting Officer. The geotextile shall be kept dry at all times and shall be stored off the ground. The geotextile shall be adequately protected from ultraviolet exposure, excessive heat, precipitation, contamination from soil, debris, etc., or any other damaging circumstances. Geotextiles shall be marked or tagged with the following information:

Manufacturer's Name
Product Identification
Lot Number
Roll number
Roll Dimensions

Appropriate handling equipment and techniques, as recommended by the manufacturer and approved by the Contracting Officer, shall be used. Any geotextile damaged as a result of poor delivery, storage, or handling methods shall be repaired or replaced, as determined by the Contracting Officer, at no additional cost to the Government.

5. WARRANTY. The Contractor shall issue a written warranty addressing geotextile material and installation workmanship. The warranty shall include a statement that the installed material meets the requirements of the project drawings and specifications and that under normal conditions, the material is warranted for 20 years. If other than overlap seams are used, the seams shall not fail within 20 years of the installation. The Contractor shall submit the warranty to the Contracting Officer for approval.

6. MATERIALS.

6.1. GENERAL REQUIREMENTS. The Contractor shall select geotextiles which meet all specification requirements and are chemically compatible with all contact materials and that meet the physical requirements outlined in the following Table 1. The Contractor shall submit two (2) samples of geotextile, each a minimum 12-inch by 12-inch in size.

6.2. RAW MATERIALS. The geotextile shall be a nonwoven needlepunched pervious sheet of polymeric yarn as defined by ASTM D 123. The geotextile fiber shall consist of long chain polymers composed of at least 85% by weight of polypropylene, polyester, polyethelene, nylon, or polyvinylidene-chloride. Stabilizers and/or inhibitors shall be added to the base polymer if necessary to make the filaments resistant to deterioration by ultra-violet and heat exposure. The fabric shall be fixed so that the yarns will retain their relative position with respect to each other. The edges of the fabric shall be finished to prevent the outer yarn from pulling away from the fabric. The geotextile physical properties (Minimum Average Roll Properties) shall equal or exceed the requirements listed in Tables 1 and 2.

Table 1. Minimum Physical Requirements for Geotextile

	Test Method	Min. Avg. Roll Value
Weight (oz/sy)	D 3776	6.0
AOS (U.S. Sieve)	D 4751	70 - 100
Permittivity (1/sec)	D 4491	1.5 to 2.5
Mullen Burst (psi)	D 3786	200
Puncture (lbs.)	D 4833	75
Grab Tensile (lbs/in.)	D 4632	150
Trapezoidal Tear (lbs.)	D 4533	60
Ultraviolet Degradation	D 4355	70% Strength Retained @ 150 hours

7. TESTS, INSPECTIONS, AND VERIFICATIONS.

7.1. MANUFACTURING SAMPLING AND TESTING. All geotextiles shall be randomly sampled and tested in accordance with the manufacturer's approved quality control program manual to evaluate the required physical properties. Certified test results on each sample shall be submitted to the Contracting Officer. In addition, one sample of each geotextile type shall be provided to the Government for quality assurance testing and permanent record of actual furnished material. Each sample shall be the full manufactured width of the geotextile and be at least 5 feet long. Samples not meeting the minimum requirements specified shall result in the rejection of the corresponding roll.

8. SURFACE PREPARATION. The surface to receive the geotextile shall be prepared to a relatively smooth condition free of obstructions. All obstructions such as depressions, debris, and soft or low density pockets of material shall be removed from the surface before geotextile placement.

9. INSTALLATION. The geotextile shall be placed in the manner and at the locations shown on the drawings. Drawings and instructions of the procedures for the geotextile placement shall be submitted to the Contracting Officer for approval. The geotextile shall be placed with minimum handling such that the geotextile and underlying materials are not damaged. Any portion of the geotextile damaged during installation shall be removed or repaired, as determined by the Contracting Officer and as specified in paragraph 12, "DEFECTS AND REPAIRS", at no additional cost to the Government. Where possible, the geotextile shall be laid smooth so as to minimize tension, stress, folds, wrinkles, or creases. The geotextile shall be protected at all times during construction from contamination by surface runoff, soil, mud, or any other foreign materials. Any geotextile so contaminated shall be removed and replaced with uncontaminated geotextile. Adequate loading (e.g. sand bags) shall be placed on the geotextile to prevent uplift by wind. No tires will be allowed for anchoring purposes. Any equipment used shall not damage the geotextile. No vehicular traffic will be allowed directly on the geotextile. The work shall be scheduled so that covering of the geotextile with the overlying material is accomplished within 72 hours after placement of the geotextile. The Contractor shall demonstrate that the proposed drainage fill placement method will not damage the geotextile. The Contractor shall not drop or dump drainage gravel or other material directly onto the geotextile from a height greater than 3 feet.

10. FIELD SEAMING. The edges of adjacent geotextile sheets shall be overlapped a minimum of 18 inches or sewn. The plan and instructions for sewn seams shall be submitted to the Contracting Officer for approval

11. PIPE PENETRATIONS AND ABUTTING STRUCTURES. The Contractor shall prepare a plan, in accordance with the manufacturer's recommendations, addressing pipe penetrations through the geotextile, or situations where geotextile placement is interrupted by structures. The plan shall be submitted to the Contracting Officer for approval at least 7 days prior to the start of geotextile placement.

12. DEFECTS AND REPAIRS. Holes or tears in the geotextile shall be repaired by placing a patch of geotextile extending a minimum of 24 inches beyond the edges of the hole or tear. All patches shall be continuously fastened by sewing or other methods approved by the Contracting Officer. Excessively damaged geotextile, as determined by the Contracting Officer, shall be replaced at no additional cost to the Government.

13. MEASUREMENT AND PAYMENT. Measurement and payment for the work covered in this section will be in conformance with SECTION 01270: MEASUREMENT AND PAYMENT.

--- END OF SECTION ---

SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

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

ENGINEERING MANUALS (EM)

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

1.2 GENERAL REQUIREMENTS

The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible; salvaged items and materials shall be disposed of as specified.

1.3 SUBMITTALS

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

SD-08 Statements

Work Plan; GA.

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

1.4 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

1.5 PROTECTION

1.5.1 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.5.2 Protection of Structures

Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, of lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.3 Protection of Existing Property

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.4 Protection From the Weather

The interior of buildings to remain; salvageable materials and equipment shall be protected from the weather at all times.

1.5.5 Protection of Trees

Trees within the project site which might be damaged during demolition, and which are indicated to be left in place, shall be protected by a 6 foot high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain that is damaged during the work under this contract shall be replaced in kind or as approved by the Contracting Officer.

1.5.6 Environmental Protection

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

1.6 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.7 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 UTILITIES

Existing utilities shall be removed as indicated. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

3.2 DISPOSITION OF MATERIAL

Title to material and equipment to be demolished, except Government salvage and historical items, is vested in the Contractor upon receipt of notice to proceed. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed.

3.2.1 Salvageable Items and Material

Contractor shall salvage items and material to the maximum extent possible.

3.2.1.1 Material Salvaged for the Contractor

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

3.2.1.2 Historical Items

Historical items shall be removed in a manner to prevent damage. The

following historical items shall be delivered to the Government for disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.

3.2.2 Unsalvageable Material

Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed of in a Contractor-determined disposal area located off-site. Combustible material shall be disposed of off the site.

3.3 CLEAN UP

Debris and rubbish shall be removed from basement and similar excavations. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

3.4 PAVEMENTS

Existing pavements designated for removal shall be saw cut and removed in accordance with the details shown on the drawings and to the limits and depths indicated on the drawings.

-- End of Section --

SECTION 02316

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only and represent the latest edition in force when this contract is awarded.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	Materials Finer than 75 um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	Particle-Size Analysis of Soils
ASTM D 698	Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	Wire-Cloth Sieves for Testing Purposes

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (PennDOT)

PennDOT Publication 408	(2003, Rev May 2004) Publication 408, Specifications

1.2 DEGREE OF COMPACTION

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698 abbreviated hereinafter as percent laboratory maximum density.

1.3 SUBMITTALS

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

SD-09 Reports

Field Density Tests; FIO;AR. Testing of Backfill Materials; FIO;AR.

Copies of all laboratory and field test reports shall be submitted to the Contracting Officer within 24 hours of the completion of the test.

Shoring and Bracing Plans;GA|ED

Copies of plans and calculations for approval not less than 60 days before installation.

Drainage and Dewatering Plans;GA|ED

Copies of plans and calculations for approval not less than 60 days before installation.

1.4 SPOIL AREAS

Spoil materials shall be disposed of in spoil areas located outside the limits of the project site at the Contractor's expense and responsibility.

1.5 BORROW AREAS

Where satisfactory materials are not available in sufficient quantity from required excavations, approved materials shall be obtained from approved sources outside the limits of the project site at the Contractor's expense and responsibility. The Contracting Officer shall be notified sufficiently in advance prior to opening any borrow area.

1.6 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered in this section shall be lump sum and shall be in conformance with Section 01270 MEASUREMENT AND PAYMENT.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Satisfactory Materials

2.1.1.1 Backfill

Satisfactory backfill materials for trenches shall be those materials classified in ASTM D 2487 as GW, GM, GC, SW, SM, SC, or combinations thereof, properly worked by the Contractor to obtain the specified compaction while maintaining the moisture content as specified hereinafter; and may also include SP, CL, ML, CH, MH, or combinations thereof, properly worked by the Contractor to obtain the specified compaction while maintaining the moisture content as specified hereinafter; however, the Contractor should be aware of the possible construction difficulties and the very close moisture control required in the proper field placement and compaction of these latter materials, as compared to the previously classified materials. Satisfactory backfill materials for trenches under paved areas shall be the same materials with the exception that materials classified as SP, CL, ML, CH, MH, or combinations thereof cannot be used.

2.1.1.2 Subgrade

Satisfactory soils for the subgrade of trenches shall consist of all subgrade soils except as specified hereinafter in the paragraph UNSATISFACTORY MATERIALS, Subgrade.

2.1.2 Unsatisfactory Materials

2.1.2.1 Backfill

Unsatisfactory backfill materials for trenches shall be those materials not meeting the requirements of the SATISFACTORY BACKFILL MATERIALS paragraph.

2.1.2.2 Subgrade

a. General: Satisfactory subgrade soils that have inadequate site and/or excavation drainage or due to negligence on the part of the Contractor by working (remolding) or compacting otherwise satisfactory in place subgrade soils under adverse moisture conditions shall be removed and replaced with satisfactory fill material or worked or altered until rendered suitable as determined by the Contracting Officer at no additional cost to the Government.

b. Trenches: Unsatisfactory materials for the subgrade of trenches shall be those materials classified in ASTM D 2487 as Pt, OH, OL, FILL (where designated on the logs without Unified Soils Classification Symbol), or combinations thereof. Unsatisfactory materials shall also include those materials containing roots and other organic matter, trash, debris, frozen materials, stones larger than 3 inches, and unstable and unyielding materials as defined hereinafter.

2.1.3 Cohesionless and Cohesive Materials

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

2.1.4 Classification of Excavation

All excavation shall be done on the unclassified basis. No consideration will be given to the nature of the material encountered.

2.1.5 Unyielding Material

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

2.1.6 Unstable Material

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

2.1.7 Select Granular Material

Select granular material shall meet the requirements of PennDOT Publication 408, Section 350.2.

2.1.8 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory backfill materials free from rocks 1 inch or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller.

2.1.9 Select Bedding Material

AASHTO No. 8, Course Aggregate, as defined in PennDOT Publication 408, Section 703.

2.1.10 Final Backfill Material

Final Backfill shall consist of Satisfactory Backfill Materials.

2.2 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking

and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in TABLE 1 and shall bear a continuous printed inscription describing the specific utility.

TABLE 1. Tape Color

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

PART 3 EXECUTION

3.1 EXCAVATION

Excavation shall be performed to the lines and grades indicated. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides or cave-ins. Excavated material not required or not satisfactory for backfill shall be removed from the site as indicated in paragraph SPOIL AREAS. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed to maintain the stability of the bottom and sides of the excavation. Unauthorized overexcavation shall be backfilled in accordance with paragraph BACKFILLING AND COMPACTION at no additional cost to the Government.Blasting will not be permitted.

3.1.1 Trench Excavation

The trench shall be excavated as indicated on the drawings or as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 4 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than feet high shall be shored. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. All excavation/shoring operation shall conform to the requirements contained in EM-385-1-1 "Safety and Health Requirements Manual." When not indicated on the contract drawings or recommended by the pipe manufacturer, the trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.1.1 Bottom Preparation

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

3.1.1.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed to the level indicated on the contract drawings or to 6 inches below the required grade when not indicated on the contract drawings and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.1.3 Removal of Unstable Material and Unsatisfactory Material

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

b. Removal of Unsatisfactory Material: Unsatisfactory material encountered beyond the depths indicated shall be removed to the depths and lateral limits directed by the Contracting Officer and replaced with satisfactory material as provided in paragraph "BACKFILLING AND COMPACTION"; payment therefore will be made in accordance with the CHANGE clause of the CONTRACT CLAUSES. Determination of elevation of approved overdepth excavations shall be done in the presence of the Contacting Officer.

3.1.1.4 Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.1.5 Jacking, Boring, and Tunneling

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

properly installed and backfill can be properly compacted in such sections.

3.1.2 Stockpiles

Stockpiles of satisfactory and unsatisfactory shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government. Locations of stockpiles of satisfactory materials shall be subject to prior approval of the Contracting Officer.

3.1.3 Drainage and Dewatering

3.1.3.1 Drainage

Excavation shall be performed so that the area of the site and the area immediately surrounding the site and affecting operations at the site will be continually and effectively drained. Water shall not be permitted to accumulate in the excavation. The excavation shall be drained by pumping or other satisfactory methods to prevent softening of the subgrade or other actions detrimental to proper construction procedures. Surface water shall be directed away from excavation and construction sites so as to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.1.3.2 Dewatering

The contractor shall note the subsurface water level recorded and date when this level was recorded on the boring logs illustrated in the contract documents. These water levels are only for the dates shown on the logs and it can be expected that the water table may fluctuate to some extent. The contractor shall examine the Boring logs and laboratory test results included in the contract documents. During construction, special care shall be taken to insure that overexcavations for foundations are accurate and no excavation for closure structures or concrete gravity wall, which will be influenced by groundwater, shall be made to final grade until dewatering has been accomplished to the satisfaction of the Contracting Officer. Prior to and during dewatering, the contractor shall survey nearby structures to the satisfaction of the Contracting Officer to insure that detrimental settlements are not occurring in these buildings due to dewatering operations performed by the contractor. Prior to installation, the contractor shall submit his dewatering plan to the Contracting Officer for review. If dewatering is to be accomplished by means of pumping from a sump, the sump shall be located at least 10 feet from the edge of any

existing structure. The contractor will be required to provide suitable protection to the sump pit walls and the excavated areas to insure that the fine-grained soils are not removed during the pumping operations.

3.2 BACKFILLING AND COMPACTION

Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Backfill shall be aerated or moistened as necessary to achieve an in-place moisture content within minus 4 percent to optimum moisture. Each layer shall be compacted to at least 100 percent maximum density for cohesionless soils and 95 percent maximum density for cohesive soils, unless otherwise specified.

3.2.1 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall be backfilled to 2 feet above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test.

3.2.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material unless otherwise shown on the contract drawings.

3.2.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 6 inches loose thickness.

3.2.1.3 Bedding and Initial Backfill

Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.2.1.4 Final Backfill

The remainder of the trench, except for special materials for roadways shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

a. Roadways: Backfill shall be placed up to the elevation at which the requirements in Section 02550 REPLACEMENT BITUMINOUS PAVING and DENSE GRADED AGGREGATE (DGA) BASE COURSE control. Water flooding or jetting methods of compaction will not be permitted.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 12 inch loose thickness, and compacted to 90 percent maximum density for cohesive soils and 95 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.2.2 Backfill for Appurtenances

After the manhole, catch basin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for a minimum of 3 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.3 SPECIAL REQUIREMENTS

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

3.3.1 Water Lines

Trenches shall be of a depth to provide a minimum cover of 5 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. For fire protection yard mains or piping, an additional 3 inches of cover is required.

3.3.2 Plastic Marking Tape

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

3.4 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. Approval of testing facilities shall be based on requirements indicated in SECTION 01451. No work requiring testing will be permitted until the facilities have been inspected and approved by the Contracting Officer. The first inspection shall be at the expense of the Government. Cost incurred for any subsequent inspection required because of failure of the first inspection will be charged to the Contractor. Tests shall be performed in sufficient numbers to insure that the specified density is being obtained. Laboratory tests for moisture-density relations shall be determined in accordance with ASTM D 698. A mechanical tamper may be used, provided the results are correlated with those obtained by the referenced hand tamper. Field in-place density shall be determined in accordance with ASTM D 1556, or ASTM D 2922. ASTM D 2922 results in a wet unit weight of soil and when

using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gages shall be checked along with the density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gages shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. Copies of calibration curves and results of calibration tests shall be furnished to the Contracting Officer within 24 hours of conclusion of tests. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government. Sieve analysis shall be performed in accordance with ASTM C 117, ASTM C 136, and ASTM D 422; sieves shall conform to ASTM E 11; and liquid limit and plasticity index determinations shall be performed in accordance with ASTM D 4318. Copies of test results shall be furnished to the Contracting Officer. The following minimum testing is required:

3.4.1 Moisture-Density, Plasticity, Sieve Analysis and Moisture Content Tests

3.4.1.1 Sieve Analysis and Plasticity

One sieve analysis (and one liquid limit and plasticity index determination for cohesive soils) per 100 cubic yards or fraction thereof of fill and backfill and per 250 linear feet or fraction thereof of subgrade.

3.4.1.2 Optimum Moisture and Laboratory Maximum Density

One moisture-density curve to determine the optimum moisture content and the laboratory maximum density values shall be done for each type of subgrade material (Fill and Cut Areas) and one curve shall be done per 100 cubic yards of each type of fill and backfill materials, to include any borrow materials.

3.4.1.3 Moisture Contents

A minimum of one test per 100 linear feet or fraction thereof of the trench subgrade prior to placement of fill or backfill thereon during stable weather conditions. In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, tests shall be made as directed by local conditions and approved by the Contracting Officer.

3.4.1.4 Additional Tests

Additional gradation, liquid limit, plasticity index determinations and moisture-density curves shall be required if there if any changes in gradation or particle shape or when any change occurs in the material which may affect the optimum moisture content or laboratory maximum density.

3.4.2 Field Density Tests

3.4.2.1 Paved Areas

One test per lift per 20 linear feet or fraction thereof of backfill materials. One test per 20 linear feet or fraction thereof of subgrade.

3.4.2.2 Other Areas

One test per lift per 100 linear feet or fraction thereof of backfill materials. One test per 100 linear feet or fraction thereof of subgrade.

3.4.2.3 Utility and Drainage Structures which Abut Pavements

One test per 12 inches of compacted thickness or fraction thereof per structure for backfill materials. One test per structure for subgrade.

3.4.3 Check Tests on In-Place Densities

If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 as follows

3.4.3.1 Paved Areas

One check test per lift per 200 linear feet or fraction thereof of backfill materials. One check test per 200 linear feet or fraction thereof of subgrade.

3.4.3.2 Other Areas

One check test per lift per 1000 linear feet or fraction thereof of backfill materials. One check test per 1000 linear feet or fraction thereof of subgrade.

3.4.3.3 Utility and Drainage Structures which Abut Pavements

One check test per 12 inches of compacted thickness or fraction thereof per 5 structures for backfill materials. One test per 5 structures for subgrade.

3.4.4 Location of Tests

Location of Tests shall be at the direction of the Government.

3.4.5 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to 2 feet above the top of the pipe, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer. Pipe sizes larger than 36 inches shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer,

the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

-- End of Section --

SECTION 02510

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA-01	(1996) 1996-1997 Manual for Railway Engineering (Fixed Properties) 4 Vol.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1996) Carbon Structural Steel
ASTM A 53	(1996) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM B 88	(1996) Seamless Copper Water Tube
ASTM C 76	(1995a) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 76M	(1996) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM D 1599	(1988; R 1995) Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D 1784	(1996) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1996a) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(1996a) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2464	(1996a) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1996a) Poly(Vinyl Chloride) (PVC) Plastic

	Pipe Fittings, Schedule 40
ASTM D 2467	(1996a) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2657	(1996) Heat Fusion Joining Polyolefin Pipe and Fittings
ASTM D 2774	(1994) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 2996	(1995) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 2997	(1995) Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Pipe
ASTM D 3839	(1994a) Underground Installation of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe
ASTM F 477	(1995) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B1.20.1	(1983; R 1992) Pipe Threads, General Purpose (Inch)
ASME B16.1	(1989) Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.3	(1992) Malleable Iron Threaded Fittings
ASME B16.26	(1988) Cast Copper Alloy Fittings for Flared Copper Tubes
ASME B36.10M	(1996) Welded and Seamless Wrought Steel Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(1992) Hypochlorites
AWWA B301	(1992) Liquid Chlorine

AWWA ANSI/AWWA C104/A21.4	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA ANSI/AWWA C105/A21.5	(1993) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA ANSI/AWWA C110/A21.10	(1993) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75# mm through 1200# mm), for Water and Other Liquids
AWWA ANSI/AWWA C111/A21.11	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA ANSI/AWWA C115/A21.15	(1994) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA ANSI/AWWA C151/A21.51	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA ANSI/AWWA C153/A21.53	(1994; Errata Nov 1996) Ductile-Iron Compact Fittings, 3 In. Through 24 In. (76 mm through 610 mm) and 54 In. through 64 In. (1,400 mm through 1,600 mm) for Water Service Liquids
AWWA C200	(1991) Steel Water Pipe - 6 In. (150 mm) and Larger
AWWA C203	(1991) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
AWWA ANSI/AWWA C205	(1995) Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied
AWWA C207	(1994) Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
AWWA ANSI/AWWA C208	(1996) Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C300	(1989) Reinforced Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA C301	(1992) Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA ANSI/AWWA C303	(1995) Concrete Pressure Pipe,

	Bar-Wrapped, Steel Cylinder Type
AWWA C500	(1993; C500a) Metal-Sealed Gate Valves for Water Supply Service
AWWA ANSI/AWWA C502	(1994; C502a) Dry-Barrel Fire Hydrants
AWWA C503	(1988) Wet-Barrel Fire Hydrants
AWWA C504	(1994) Rubber-Seated Butterfly Valves
AWWA C509	(1994) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(1993) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1987) Grooved and Shouldered Joints
AWWA C651	(1992) Disinfecting Water Mains
AWWA ANSI/AWWA C700	(1995) Cold-Water Meters - Displacement Type, Bronze Main Case
AWWA C701	(1988) Cold-Water Meters - Turbine Type, for Customer Service
AWWA ANSI/AWWA C702	(1992) Cold-Water Meters - Compound Type
AWWA ANSI/AWWA C703	(1996) Cold-Water Meters - Fire Service Type
AWWA ANSI/AWWA C704	(1992) Propeller-Type Meters Waterworks Applications
AWWA C706	(1996) Direct-Reading, Remote-Registration Systems for Cold-Water Meters
AWWA ANSI/AWWA C707	(1982; R 1992) Encoder-Type Remote-Registration Systems for Cold-Water Meters
AWWA C800	(1989) Underground Service Line Valves and Fittings
AWWA C900	(1989; C900a) Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution
AWWA C901	(1996) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In., for Water Service
AWWA C905	(1988) Polyvinyl Chloride (PVC) Water

	Transmission Pipe, Nominal Diameters 14 In. Through 36 In.
AWWA C950	(1995) Fiberglass Pressure Pipe
AWWA M23	(1980) Manual: PVC Pipe - Design and Installation

ASBESTOS CEMENT PIPE PRODUCERS ASSOCIATION (ACPPA)

ACPPA-01	(1988) Recommended Work Practices for A/C Pipe

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

DIPRA-01	(1997) Thrust Restraint Design for Ductile Iron Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response
NFPA 1961	(1997) Fire Hose

NSF INTERNATIONAL (NSF)

NSF ANSI/NSF 14	(1996) Plastics Piping Components and Related Materials

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 21	(1991) White or Colored Silicone Alkyd Paint
SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)

1.2 PIPING

This section covers all water distribution relocation work. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.2.1 Distribution Lines 80 mm (3 Inches) or Larger

Piping for water distribution lines 3 inches or larger shall be ductile iron or polyvinyl chloride (PVC) plastic through 12 inch nominal diameter unless otherwise shown or specified.

1.2.2 Plastic Piping System

Plastic piping system components (PVC) intended for transportation of potable water shall comply with NSF ANSI/NSF 14 and be legibly marked with their symbol.

1.2.3 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be in accordance with the applicable provisions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

1.3 SUBMITTALS

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

SD-06 Instructions

Installation; FIO.

The manufacturer's recommendations for each material or procedure to be utilized.

SD-08 Statements

Waste Water Disposal Method; GA.

The method proposed for disposal of waste water from hydrostatic tests and disinfection, prior to performing hydrostatic tests.

Satisfactory Installation; FIO.

A statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

SD-09 Reports

Bacteriological Disinfection; FIO.

Test results from commercial laboratory verifying disinfection.

SD-13 Certificates

Installation; FIO.

A statement signed by the manufacturer's field representative certifying that the Contractor's personnel are capable of properly installing the pipe on the project.

1.4 HANDLING

Pipe and accessories shall be handled to ensure delivery to the trench in sound, undamaged condition, including no injury to the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor in a satisfactory manner, at no additional cost to the Government. No other pipe or material shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

1.4.1 Miscellaneous Plastic Pipe and Fittings

Polyvinyl Chloride (PVC) pipe and fittings shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Plastic Pipe

2.1.1.1 PVC Plastic Pipe

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B.

a. OMITTED

b. Pipe 4 through 12 inch Diameter: Pipe, couplings and fittings shall conform to AWWA C900, Class 150, CIOD pipe dimensions, elastomeric-gasket joint, unless otherwise shown or specified.

2.1.2 Ductile-Iron Pipe

Ductile-iron pipe shall conform to AWWA ANSI/AWWA C151/A21.51, working pressure not less than 150 psi, unless otherwise shown or specified. Pipe shall be cement-mortar lined in accordance with AWWA ANSI/AWWA C104/A21.4. Linings shall be standard.

2.1.3 Copper Tubing

Copper tubing shall conform to ASTM B 88, Type K, annealed.

2.2 FITTINGS AND SPECIALS

2.2.1 PVC Pipe System

a. OMITTED

b. For pipe 4 inch diameter and larger, fittings and specials shall be iron, bell end in accordance with AWWA ANSI/AWWA C110/A21.10, 150 psi pressure rating unless otherwise shown or specified, except that profile of bell may have special dimensions as required by the pipe manufacturer; or fittings and specials may be of the same material as the pipe with elastomeric gaskets, all in conformance with AWWA C900. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA ANSI/AWWA C104/A21.4. Fittings shall be bell and spigot or plain end pipe, or as applicable. Ductile iron compact fittings shall be in accordance with AWWA ANSI/AWWA C153/A21.53.

2.2.2 Ductile-Iron Pipe System

Fittings and specials shall be suitable for 150 psi pressure rating, unless otherwise specified. Fittings and specials for mechanical joint pipe shall conform to AWWA ANSI/AWWA C110/A21.10. Fittings and specials for use with push-on joint pipe shall conform to AWWA ANSI/AWWA C110/A21.10 and AWWA ANSI/AWWA C111/A21.11. Fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA ANSI/AWWA C104/A21.4. Ductile iron compact fittings shall conform to AWWA ANSI/AWWA C153/A21.53.

2.2.3 Copper Tubing System

Fittings and specials shall be flared and conform to ASME B16.26.

2.3 JOINTS

2.3.1 Plastic Pipe Jointing

2.3.1.1 PVC Pipe

Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer.

2.3.2 Ductile-Iron Pipe Jointing

a. Mechanical joints shall be of the stuffing box type and shall conform to AWWA ANSI/AWWA C111/A21.11.

b. Push-on joints shall conform to AWWA ANSI/AWWA C111/A21.11.

c. Rubber gaskets and lubricants shall conform to the applicable requirements of AWWA ANSI/AWWA C111/A21.11.

2.3.3 Copper Tubing Jointing

Joints shall be compression-pattern flared and shall be made with the specified fittings.

2.4 VALVES

2.4.1 Gate Valves

Gate valves shall be designed for a working pressure of not less than 150 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

a. Valves smaller than 3 inches shall be all bronze and shall conform to MSS SP-80, Type 1, Class 150.

b. Valves 3 inches and larger shall be iron body, bronze mounted, and shall conform to AWWA C500. Flanges shall not be buried. An approved pit shall be provided for all flanged connections.

c. Resilient-Seated Gate Valves: For valves 3 to 12 inches in size, resilient-seated gate valves shall conform to AWWA C509.

2.5 VALVE BOXES

Valve boxes shall be cast iron. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch.

2.6 BLOWOFF VALVE PIT

Valve pits shall be constructed at location indicated. Concrete shall have

compressive strength of 4000 psi in accordance with Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.7 MISCELLANEOUS ITEMS

2.7.1 Corporation Stops

Corporation stops shall have standard corporation stop thread conforming to AWWA C800 on the inlet end, with flanged joints, compression pattern flared tube couplings, or wiped joints for connections to goosenecks.

2.7.2 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed. Squeeze type mechanical cutters shall not be used for ductile iron.

3.1.2 Adjacent Facilities

3.1.2.1 Sewer Lines

Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe, for a distance of at least 10 feet each side of the crossing, shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewage force mains or inverted siphons and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete.

3.1.2.2 Water Lines

Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

3.1.2.3 Copper Tubing Lines

Copper tubing shall not be installed in the same trench with ferrous piping materials.

3.1.2.4 Nonferrous Metallic Pipe

Where nonferrous metallic pipe, e.g. copper tubing, crosses any ferrous piping material, a minimum vertical separation of 12 inches shall be maintained between pipes.

3.1.3 Joint Deflection

3.1.3.1 Offset for Flexible Plastic Pipe

Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

3.1.3.2 Allowable for Ductile-Iron Pipe

The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.

3.1.4 Placing and Laying

Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Water-line materials shall not be dropped or dumped into the trench. Abrasion of the pipe coating shall be avoided. Except where necessary in making connections with other lines or as authorized by the Contracting Officer, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joints are complete. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by and at the Contractor's expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored, as shown.

3.1.4.1 Plastic Pipe Installation

PVC pipe shall be installed in accordance with AWWA M23.

3.1.4.2 Piping Connections

Where connections are made between new work and existing mains, the

connections shall be made by using specials and fittings to suit the actual conditions. When made under pressure, these connections shall be installed using standard methods as approved by the Contracting Officer. Connections to existing asbestos-cement pipe shall be made in accordance with ACPPA-01.

3.1.4.3 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.5 Jointing

3.1.5.1 PVC Plastic Pipe Requirements

a. OMITTED

b. Pipe 4 through 12 inch diameter: Joints shall be elastomeric gasket as specified in AWWA C900. Jointing procedure shall be as specified for pipe less than 4 inch diameter with configuration using elastomeric ring gasket.

3.1.5.2 Ductile-Iron Pipe Requirements

Mechanical and push-on type joints shall be installed in accordance with AWWA C600 for buried lines.

3.1.5.3 Copper Tubing Requirements

Joints shall be made with flared fittings. The flared end tube shall be pulled tightly against the tapered part of the fitting by a nut which is part of the fitting, so there is metal-to-metal contact.

3.1.5.4 Transition Fittings

Connections between different types of pipe and accessories shall be made with transition fittings approved by the Contracting Officer.

3.1.6 Setting of Valves and Valve Boxes

3.1.6.1 Location of Valves

After delivery, valves shall be drained to prevent freezing and shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and valves shall be fully opened and fully closed to ensure that all parts are in working condition. Blowoff valves shall be installed in valve pits. Valves and valve boxes shall be installed where shown or specified, and shall be set plumb. Valve boxes shall be centered on the valves. Boxes shall be installed over each outside gate valve unless otherwise shown. Where feasible, valves shall be located outside the area of roads and streets. Earth fill shall be tamped around

each valve box or pit to a distance of 4 feet on all sides of the box, or the undisturbed trench face if less than 4 feet.

3.1.7 Thrust Restraint

Plugs, caps, tees and bends deflecting 11.25 degrees or more, either vertically or horizontally, on waterlines 4 inches in diameter or larger, and fire hydrants shall be provided with thrust restraints. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Thrust restraints shall be either thrust blocks or, for ductile-iron pipes, restrained joints.

3.1.7.1 Thrust Blocks

Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 2,000 psi after 28 days. Blocking shall be placed between solid ground and the hydrant or fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.1.7.2 Restrained Joints

For ductile-iron pipe, restrained joints shall be designed by the Contractor or the pipe manufacturer in accordance with DIPRA-01.

3.2 HYDROSTATIC TESTS

Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking, unless otherwise approved.

3.2.1 Pressure Test

After the pipe is laid, the joints completed, fire hydrants permanently installed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of 200 psi. Water supply lines designated on the drawings shall be subjected for 1 hour to a hydrostatic pressure test of 200 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants, and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic tests may

be waived by the Contracting Officer when one or more of the following conditions is encountered:

a. Wet or unstable soil conditions in the trench.

b. Compliance would require maintaining barricades and walkways around and across an open trench in a heavily used area that would require continuous surveillance to assure safe conditions.

c. Maintaining the trench in an open condition would delay completion of the project.

The Contractor may request a waiver, setting forth in writing the reasons for the request and stating the alternative procedure proposed to comply with the required hydrostatic tests. Backfill placed prior to the tests shall be placed in accordance with the requirements of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.2.2 Leakage Test

Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not less than 200 psi pressure. Water supply lines designated on the drawings shall be subjected to a pressure equal to 200 psi. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof, necessary to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

L = 0.0001351ND(P raised to 0.5 power)

L = Allowable leakage in gallons per hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, in psi gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the Government.

3.2.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipelines jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

3.2.4 Concurrent Hydrostatic Tests

The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be as specified. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government.

a. Pressure test and leakage test may be conducted concurrently.

b. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

3.3 DISINFECTION

3.3.1 Bacteriological Disinfection

Before acceptance of potable water operation, each unit of completed waterline shall be disinfected as specified. After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite, conforming to paragraph MISCELLANEOUS ITEMS. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the water lines in an approved manner. Polyvinyl Chloride (PVC) pipe lines shall be chlorinated using only the above specified chlorinating material in solution. The agent shall not be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. Valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each fire hydrant on the line shall be opened and closed several times. From several points in the unit, personnel from the Contractor's commercial laboratory shall take at least 3 water samples from different points, approved by the Contracting Officer, in proper sterilized containers and perform a bacterial examination in accordance with state approved methods. The commercial laboratory shall be certified by the state's approving authority for examination of potable water. The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

3.3.2 Lead Residual

Following the bacteriological disinfection and testing, the system shall be

flushed with a sufficient velocity of water and sufficient tests performed at each hot and cold water discharge point until no more than 15 ppb lead residuals remain in the system. All tests and samples shall be performed in accordance with state and, if applicable, Federal regulations. Samples for testing are to be collected after a 6 hour continuous period of no flushing, and will be considered first draw samples. The commercial laboratory shall be certified by the state's approving authority for examination of potable water. Lead residual test results shall be submitted to the Contracting Officer. The system will not be accepted until satisfactory bacteriological results and lead residual test results have been obtained. All flushing and testing for lead residuals, including all costs, are the responsibility of the Contractor.

3.4 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --

SECTION 02531

SANITARY SEWERS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM C 14	(1995) Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 33	(1993) Concrete Aggregates
ASTM C 76	(1995a) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 94	(1996) Ready-Mixed Concrete
ASTM C 150	(1997) Portland Cement
ASTM C 270	(1997) Mortar for Unit Masonry
ASTM C 443	(1994) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(1996) Precast Reinforced Concrete Manhole Sections
ASTM C 478M	(1996) Precast Reinforced Concrete Manhole Sections (Metric)
ASTM C 828	(1991, R 1996) Low-Pressure Air Test of Vitrified Clay Pipe Lines
ASTM C 924	(1989) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
ASTM C 972	(1995) Compression-Recovery of Tape Sealant
ASTM D 412	(1992) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers -

	Tension
ASTM D 624	(1991; R 1996) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1784	(1996) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2680	(1995a)Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	(1996) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(1994) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F 402	(1993) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 794	(1995a) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 949	(1994) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	(1990) Recommended Practice for the Low-Pressure Air Testing of Installed Sewer Pipe
UBPPA UNI-B-9	(1990; Addenda 1994) Recommended Performance Specification for Polyvinyl Chloride (PVC) Profile Wall Gravity Sewer

Pipe and Fittings Based on Controlled Inside Diameter (Nominal Pipe Sizes 4-48 inch)

1.2 GENERAL REQUIREMENTS

The Contractor shall replace damaged material and redo unacceptable work at no additional cost to the Government. Excavation and backfilling is specified in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Backfilling shall be accomplished after inspection by the Contracting Officer. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3 MEASUREMENT AND PAYMENT

Measurements and payments will be made in accordance with Section 01270 MEASUREMENT AND PAYMENT.

1.3.1 Installed Pipe

The length of pipe installed will be measured from center to center of manholes and from the center of sewer to the end of the service connections without deduction for fittings or diameters of manholes and will be paid for according to the applicable contract unit price per foot for the size of pipe. No extra payment will be made for bends.

1.3.2 Manholes

The depth of manholes will be measured from the top of the cover to the invert of the outlet pipe. Manholes will be paid for according to the applicable contract price each for the depth of manhole indicated in the payment schedule. No extra payment will be made for drop manholes except that the concrete used for encasing the drop connection will be measured and paid for according to the contract unit price per cubic yard of concrete for encasement, and no extra payment will be made for pipe fittings required to make connections to manholes.

1.3.3 Concrete

Concrete used for pipe encasement, cradles, and similar supports, indicated or required for reasons other than faulty construction methods or negligence of the Contractor, will be measured and paid for according to the contract unit price for concrete for encasement and cradles.

1.3.4 Connections to Existing Manholes

Connections to existing manholes will be paid for according to the applicable contract unit price per connection for each required size of pipe, which shall be full compensation for all necessary cutting, shaping, pipe fittings, and concrete, except that concrete required for encasing or cradling pipe outside the manhole will be measured and paid for according to the contract unit price for such concrete.

1.3.5 Wye Branches

Wye branches installed in new sewers will be paid for according to the applicable contract unit price for the size indicated in the payment schedule. This will be in addition to the price per foot of straight pipe.

1.3.6 Connections to Existing Sewers

Connections to existing sewers where new wye branches to cut-ins are required will be paid for according to the contract unit price for such connection. The price will be considered as full compensation for material and labor required for the removal and replacement of the pipe as necessary. Excavation, backfill, and concrete connected with such work will be paid for according to the applicable contract unit prices. Connections of this type made to sewers installed under this contract, if ordered after the sewer has been installed, will be paid for as connection to existing sewers.

1.4 SUBMITTALS

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

SD-13 Certificates

Portland Cement; GA.

Certificates of compliance stating the type of cement used in manufacture of concrete pipe, fittings and precast manholes.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Concrete Pipe

Concrete pipe 24 inches or less in diameter, unless otherwise shown or specified, shall be nonreinforced and conform to ASTM C 14, Class 2.

Concrete pipe greater than 24 inches in diameter shall be reinforced and conform to ASTM C 76, Class 3. Pipe less than 36 inches in diameter shall be bell and spigot type. Pipe 36 inches or greater in diameter shall be bell and spigot type, tongue and groove type, or modified tongue and groove type.

2.1.2 Plastic Pipe

Acrylonitrile-butadiene-styrene (ABS) and polyvinyl chloride (PVC) composite sewer piping shall conform to ASTM D 2680. Size 8 inch through 15 inch diameter.

2.1.2.1 PVC Pipe

ASTM D 3034, Type PSM with a maximum SDR of 35, Size 15 inches or less in diameter. ASTM F 949 for corrugated sewer pipes with a smooth interior. UBPPA UNI-B-9 and ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior, size 8 inch through 48 inch diameters. PVC shall be certified by the compounder as meeting the requirements of ASTM D 1784, cell Class 12454B. The pipe stiffness shall be greater than or equal to 735/D for cohesionless material pipe trench backfills.

2.2 REQUIREMENTS FOR FITTINGS

Fittings shall be compatible with the pipe supplied and shall have a strength not less than that of the pipe. Fittings shall conform to the respective specifications and other requirements specified below.

2.2.1 Fittings for Concrete Pipe

ASTM C 14 for pipe 24 inches or less in diameter. ASTM C 76 for pipe greater than 24 inches in diameter.

2.2.2 Fittings for Plastic Pipe

ABS and PVC composite sewer pipe fittings shall conform to ASTM D 2680.

2.2.2.1 Fittings for PVC Pipe

ASTM D 3034 for type PSM pipe. ASTM F 949 for corrugated sewer pipe with a smooth interior. UBPPA UNI-B-9 and ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior.

2.3 JOINTS

Joints installation shall comply with the manufacturer's instructions.

2.3.1 Concrete Pipe Jointing

Joints and gaskets shall conform to ASTM C 443.

2.3.2 Plastic Pipe Jointing

Flexible plastic pipe (PVC or high density polyethylene pipe) gasketed

joints shall conform to ASTM D 3212.

2.4 BRANCH CONNECTIONS

Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for ABS and PVC composite pipe shall conform to Figure 2 of ASTM D 2680; saddles for ABS pipe shall comply with Table 3 of ASTM D 2751; and saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

2.5 FRAMES AND COVERS

Frames and covers shall be cast iron, ductile iron or reinforced concrete. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 400 pounds. Reinforced concrete frames and covers shall be as indicated or shall conform to ASTM C 478 or ASTM C 478M. The word "Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.6 STEEL LADDER

A steel ladder shall be provided where the depth of an inlet exceeds 5 feet. The ladder shall not be less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123.

2.7 CEMENT MORTAR

Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

2.7.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type II for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalies shall be used.

2.7.2 Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94, compressive strength of 4000 psi at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 2500 psiminimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.

2.8 STRUCTURES

2.8.1 Precast Reinforced Concrete Manhole Sections

Precast reinforced concrete manhole sections shall conform to ASTM C 478,

except that portland cement shall be as specified herein. Joints shall be cement mortar, an approved mastic, rubber gaskets, a combination of these types; or the use of external preformed rubber joint seals and extruded rolls of rubber with mastic adhesive on one side.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Adjacent Facilities

3.1.1.1 Water Lines

Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be closer horizontally than 10 feet to a water-supply main or service line, except that where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, the horizontal spacing may be a minimum of 6 feet. Where gravity-flow sewers cross above water lines, the sewer pipe for a distance of 10 feet on each side of the crossing shall be fully encased in concrete or shall be acceptable pressure pipe with no joint closer horizontally than 3 feet to the crossing. The thickness of the concrete encasement including that at the pipe joints shall be not less than 4 inches.

3.1.1.2 Structural Foundations

Where sewer pipe is to be installed within 3 feet of an existing or proposed building or structural foundation such as a retaining wall, control tower footing, water tank footing, or any similar structure, the sewer pipe shall be sleeved as specified above. Contractor shall ensure there is no damage to these structures, and no settlement or movement of foundations or footing.

3.1.2 Pipe Laying

a. Pipe shall be protected during handling against impact shocks and free fall; the pipe interior shall be free of extraneous material.

b. Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow. Each pipe shall be laid accurately to the line and grade shown on the drawings. Pipe shall be laid and centered so that the sewer has a uniform invert. As the work progresses, the interior of the sewer shall be cleared of all superfluous materials.

c. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted to obtain the degree of water tightness required.

d. ABS composite pipe ends with exposed truss and filler material shall be coated with solvent weld material before making the joint

to prevent water or air passage at the joint between the inner and outer wall of the pipe.

e. Installations of solvent weld joint pipe, using ABS or PVC pipe and fittings shall be in accordance with ASTM F 402. The Contractor shall ensure adequate trench ventilation and protection for workers installing the pipe.

3.1.2.1 Caulked Joints

The packing material shall be well packed into the annular space to prevent the entrance of lead into the pipe. The remainder of the space shall be filled with molten lead that is hot enough to show a rapid change in color when stirred. Scum shall be removed before pouring. The lead shall be caulked to form a tight joint without overstraining the bell and shall have a minimum depth of 1 inch after caulking.

3.1.2.2 Trenches

Trenches shall be kept free of water and as dry as possible during bedding, laying, and jointing and for as long a period as required. When work is not in progress, open ends of pipe and fittings shall be satisfactorily closed so that no trench water or other material will enter the pipe or fittings.

3.1.2.3 Backfill

As soon as possible after the joint is made, sufficient backfill material shall be placed along the pipe to prevent pipe movement off line or grade. Plastic pipe shall be completely covered to prevent damage from ultraviolet light.

3.1.2.4 Width of Trench

If the maximum width of the trench at the top of the pipe, as specified in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, is exceeded for any reason other than by direction, the Contractor shall install, at no additional cost to the Government, concrete cradling, pipe encasement, or other bedding required to support the added load of the backfill.

3.1.2.5 Jointing

Joints between different pipe materials shall be made as specified, using approved jointing materials.

3.1.2.6 Handling and Storage

Pipe, fittings and joint material shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities for plastic pipe, fittings, joint materials and solvents shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

3.1.3 Leakage Tests

Lines shall be tested for leakage by low pressure air testing, infiltration tests or exfiltration tests, as appropriate. Low pressure air testing for vitrified clay pipes shall be as prescribed in ASTM C 828. Low pressure air testing for concrete pipes shall be as prescribed in ASTM C 828. Low pressure air testing for PVC pipe shall be as prescribed in UBPPA UNI-B-6. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 and ASTM C 924, after consultation with the pipe manufacturer. Prior to infiltration or exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 2 feet or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. When the Contracting Officer determines that infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2 feet is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 0.2 gal per inch diameter per 100 feet of pipeline per hour. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Government.

3.1.4 Test for Deflection

When flexible pipe is used, a deflection test shall be made on the entire length of the installed pipeline not less than 30 days after the completion of all work including the leakage test, backfill, and placement of any fill, grading, paving, concrete, or superimposed loads. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. The ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 92.5 percent of the inside diameter of the pipe, but 95 percent for RPMP and RTRP. A tolerance of plus 0.5 percent will be permitted. The ball, cylinder, or circular sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of 70,000 psi or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on the opposite end of the shaft shall produce compression throughout the remote end of the ball, cylinder or circular section. Circular sections shall be spaced so that the distance from the external faces of the front and back sections shall equal or

exceed the diameter of the circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through or by being flushed through with water, shall be cause for rejection of that run. When a deflection device is used for the test in lieu of the ball, cylinder, or circular sections described, such device shall be approved prior to use. The device shall be sensitive to 1.0 percent of the diameter of the pipe being measured and shall be accurate to 1.0 percent of the indicated dimension. Installed pipe showing deflections greater than 7.5 percent of the normal diameter of the pipe, or 5 percent for RTRP and RPMP, shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.2 CONCRETE CRADLE AND ENCASEMENT

The pipe shall be supported on a concrete cradle, or encased in concrete where indicated or directed.

3.3 INSTALLATION OF WYE BRANCHES

Wye branches shall be installed where sewer connections are indicated or where directed. Cutting into piping for connections shall not be done except in special approved cases. When the connecting pipe cannot be adequately supported on undisturbed earth or tamped backfill, the pipe shall be encased in concrete backfill or supported on a concrete cradle as directed. Concrete required because of conditions resulting from faulty construction methods or negligence by the Contractor shall be installed at no additional cost to the Government. The installation of wye branches in an existing sewer shall be made by a method which does not damage the integrity of the existing sewer. One acceptable method consists of removing one pipe section, breaking off the upper half of the bell of the next lower section and half of the running bell of wye section. After placing the new section, it shall be rotated so that the broken half of the bell will be at the bottom. The two joints shall then be made with joint packing and cement mortar.

3.4 MANHOLE DETAILS

3.4.1 General Requirements

Manholes shall be constructed of glass-fiber-reinforced polyester, prefabricated plastic, concrete, or precast concrete manhole sections. The invert channels shall be smooth and semicircular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels shall be formed directly in the concrete of the manhole base, or shall be built up with brick and mortar, or shall be half tile laid in concrete, or shall be constructed by laying full section sewer pipe through the manhole and breaking out the top half after the surrounding concrete has hardened. Pipe connections shall be made to manhole using water stops, standard O-ring joints, special manhole coupling, or shall be made in accordance with the manufacturer's recommendation. The Contractor's proposed method of connection, list of

materials selected, and specials required, shall be approved prior to installation. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than 1 inch per foot nor more than 2 inches per foot. Free drop inside the manholes shall not exceed 18 inches, measured from the invert of the inlet pipe to the top of the floor of the manhole outside the channels; drop manholes shall be constructed whenever the free drop would otherwise be greater than 1 foot 6 inches.

3.4.2 Steel Ladder Anchorage

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

3.4.3 Jointing, Plastering and Sealing

Mortar joints shall be completely filled and shall be smooth and free from surplus mortar on the inside of the manhole. Mortar and mastic joints between precast rings shall be full-bedded in jointing compound and shall be smoothed to a uniform surface on both the interior and exterior of the manhole. Installation of rubber gasket joints between precast rings shall be in accordance with the recommendations of the manufacturer. Precast rings may also be sealed by the use of extruded rolls of rubber with mastic adhesive on one side.

3.4.4 Setting of Frames and Covers

Unless otherwise indicated, tops of frames and covers shall be set flush with finished grade in paved areas or 2 inches higher than finished grade in unpaved areas. Frame and cover assemblies shall be sealed to manhole sections using external preformed rubber joint seals that meet the requirements of ASTM D 412 and ASTM D 624, or other methods specified in paragraph Jointing, Plastering and Sealing, unless otherwise specified.

3.4.5 External Preformed Rubber Joint Seals

External preformed rubber joint seals and extruded rolls of rubber with mastic adhesive shall meet the requirements of ASTM D 412 and ASTM C 972 to ensure conformance with paragraph Leakage Tests. The seal shall be multi-section with neoprene rubber top section and all lower sections made of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and a bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. One unit shall seal a casting and up to six, 2 inch adjusting rings. The bottom section shall be 12 inches in height. A 6 inch high top section will cover up to two, 2 inchadjusting rings. A 12 inch high bottom section will cover up to six, 2 inch adjusting rings. Extension sections shall cover up to two more adjusting rings. Each extension shall overlap the bottom section by 2 inches and shall be overlapped by the top section by 2 inches.

3.5 CONNECTING TO EXISTING MANHOLES

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

3.6 CLEANOUTS AND OTHER APPURTENANCES

Cleanouts and other appurtenances shall be installed where shown on the drawings or as directed by the Contracting Officer, and shall conform to the detail of the drawings.

-- End of Section --

SECTION 02542

STONE PROTECTION (RIPRAP)

PART 1 GENERAL

1.1 SCOPE: The work covered by this section consists of furnishing all plant, labor, equipment, and materials, and performing all operations in connection with the construction of stone protection for the Garfield Avenue Storm Water Transport System as shown on the drawings or as directed by the Contracting Officer in accordance with these specifications and applicable drawings.

1.2. APPLICABLE PUBLICATIONS: 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 and represent the latest edition in force when this contract is awarded.

1.2.1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

C 97-90	Standard Test Method for Absorption and Bulk Specific Gravity of Dimension Stone
C 127-93	Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate
C 136-96	Sieve Analysis of Fine and Coarse Aggregates
C 295-90	Standard Guide for Petrographic Examination of Aggregates for Concrete
C 535-89	Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
D 75-87	Sampling Aggregates
D 4992-94	Standard Practice for Evaluation of Rock to be Used for Erosion Control
D 5312-92	Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
D 5519-94	Particle Size Analysis of Natural and Man-Made Riprap Materials

1.2.2. DEPARTMENT OF THE ARMY - CORPS OF ENGINEERS PUBLICATIONS:

EM 1110-2-1906	Laboratory Soils Testing, 30 November 1970
EM 1110-2-2302	Construction With Large Stone, 24 October 1990

1.2.3. COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF TRANSPORTATION SPECIFICATIONS. Publication 408/2003, Change No. 1, for projects let after April 2, 2004.

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

SD-01 Data

Stone Source Submittal (GA): Within fifteen (15) calendar days after Notice To Proceed (NTP) and for each individual stone source identified as a potential stone material supplier for use on this project, the Contractor, shall submit in report format service record, test reports, and other ancillary data specified in PART 2 paragraphs 2.1.6 “SOURCES OF STONE,” and 2.1.7 “TESTING AND APPROVAL FOR STONE QUALITY.” Sources used in combination should be identified with anticipated percentages. The Stone Source Submittal(s) shall be prepared and stamped with an official seal by a Pennsylvania licensed Professional Geologist.

Construction Methods (GA): The Contractor shall submit his proposed method of construction, to include the sequence of stone placement, methods of placement, and equipment to be used during each construction phase. Submit to the Contracting Officer for approval at least 30 calendar days prior to the scheduled start of work, in accordance with Part 3, “EXECUTION.” The proposed construction methods shall address all construction involving riprap placement.

Stone Quality Control (QC) Testing (GA): The Contractor shall submit QC test results for stone material produced from each quarry for each distinct lithologic type stone identified within that quarry. QC testing shall be performed by an independent and Government approved laboratory. The QC procedures are specified in PART 2 of this section; paragraph 2.1.4 “EVALUATION TESTING.”

Riprap Gradations; (FIO): Gradation test results demonstrating compliance with the requirements of paragraph 2.1.2 shall be submitted for review as specified in paragraph 3.4.2.

Bedding Material; (FIO): Gradation test results demonstrating compliance with the requirements of paragraph 2.2 shall be submitted for review as specified in paragraph 3.4.1.

SD-14 Samples

QC Stone Samples GA: For each stone source identified in the Stone Source submittal as a potential stone material supplier, the Contractor shall submit one or more QC split samples of stone material from each distinctive stratum, bed, or change of material type in the quarry during QC test sampling. A sufficient number of samples shall be furnished to adequately represent the whole quarry or that part of the quarry from which the material will be obtained, as specified in PART 2 paragraphs

2.1.6 “SOURCES OF STONE,” and 2.1.7 “TESTING AND APPROVAL FOR STONE QUALITY.”

PART 2 PRODUCTS

2.1 STONE

2.1.1 General: Stone shall consist of fresh, sound, hard, dense, durable rock which shall be separated from bedrock by quarrying. No schistose stone or any highly foliated stone will be acceptable. Sedimentary or metamorphic stone containing carbonaceous, coal, or clay seams/lenses or stone containing stylolites or similar deleterious features will likewise not be acceptable. Testing criteria is outlined in paragraph 2.1.4 herein.

2.1.2 RIP-RAP GRADATION: Stone shall conform to the gradations for R-4 and R-7 riprap as indicated in Section 850 of the latest version of Pennsylvania DOT Publication 408.

2.1.3 SIZE AND SHAPE OF STONE: Rip-rap shall be furnished in blocky and angular shapes, with its greatest dimension not greater than three times its least dimension. The maximum dimension of a stone shall be defined as the maximum distance that can be obtained between two parallel planes by placing and rotating, in all directions, the stone between the planes while having the stone "touch" both planes. The minimum dimension of a stone shall be defined as the minimum distance that can be obtained by the procedures specified above. Flat stones, slabs, boulders and parts of boulders will be rejected. Not more than 5 percent by weight of clean spalls resulting from loading and shipment will be allowed in any one load.

2.1.4 EVALUATION TESTING: Rock shall meet the following test criteria:

Property	Test Method	Test Value
Petrography	ASTM C-295	Fresh, interlocking crystalline, with few vugs, no clay minerals, and no soluble minerals
Specific Gravity	ASTM C-97	2.65 minimum
Absorption	ASTM C-127	Less than 1%
Abrasion	ASTM C-535	Less than 20% loss for 500 revolutions
Freezing and Thawing	ASTM D-5312	Less than 2% loss for 30 cycles

2.1.5 IDENTIFICATION OF STONE SOURCES: The sources from which the Contractor proposes to obtain rip-rap materials required for the features covered in these specifications shall be selected and identified to the Contracting Officer. Procedures for identifying stone sources are specified in paragraph 2.1.6 “SOURCES OF STONE.” Criteria for approval of proposed stone sources is presented below in paragraph 2.1.7 “TESTING AND APPROVAL FOR STONE QUALITY.”

2.1.6 SOURCES OF STONE: The Contractor may utilize one or more stone sources (quarries) during the period of this contract; however, each quarry must be identified in a separate Stone Source Submittal. The Stone Source Submittal(s) shall be prepared, reviewed, and stamped with official seal by a Pennsylvania licensed Professional Geologist. The Contractor shall submit to the Contracting Officer all available information and usage history from each quarry, which reflect the ability of the quarry to produce stone meeting the criteria specified herein. The written submittal shall also include such geological information as quarry location, areas of the quarry producing stone (in map format), ledges, specific strata, quarrying procedures/practices, each lithology mined in the quarry, geologic structure, service records of previous use in riprap or armor stone structures and gradation or size of material used, and other data including available laboratory test records. All testing required, for determining stone quality in the Stone Source submittal, shall be at the Contractor’s expense and shall have been performed within the last two (2) years. The tests performed shall be only those specified in paragraph 2.1.4. The Contracting Officer, or his designated representative, shall be present during sampling and shall approve the selection of all samples prior to shipping and may personally select any or all of the samples to be tested if they so elect. Samples shall be representative of the size and quality of stone to be used in the project structure. After Government receipt of the Stone Source submittal but before stone placement, the quarry shall also be subsequently inspected by the Contracting Officer, or his designated representative, to verify the presence of material that meets all requirements specified herein.

2.1.7 TESTING AND APPROVAL FOR STONE QUALITY: The acceptability and approval of the stone shall be determined from the following: visual examination of geological features of each sample, examination of the quarry, and QC stone testing results. Visual geologic examination will consider distinctions based on color, massiveness, structural features, and other visual characteristics such as: detrimental cracks, seams, and other defects which tend to increase deterioration from natural causes or cause breakage during handling or placing. The QC tests to which the materials will be subjected include petrographic analysis, specific gravity, abrasion, absorption, unit weight determination, freezing and thawing, X-ray diffraction and such other tests as may be considered necessary to demonstrate to the satisfaction of the Contracting Officer that the materials are acceptable for use in the work. Approval of any source of stone shall not be construed as approval of all of the stone produced from that source.

2.1.8 STONE NOT MEETING THE SPECIFICATIONS: If, during the progress of the work, it is found that the stone being furnished and/or placed by the Contractor does not fully meet all the requirements of the specifications, the Contractor shall be required to furnish other stone of a quality meeting criteria specified herein. Any stone rejected at the site of the work as not meeting the requirements of these specifications for quality, condition, size, gradation or otherwise shall be removed from the site by and at the expense of the Contractor, and stone of suitable quality shall be furnished and/or placed at no additional cost to the Government. The Contractor shall dispose of all rejected stone in a manner approved by the Contracting Officer.

2.2 BEDDING MATERIAL: Bedding material shall consist of sand, gravel, or crushed stone, well graded to satisfy the gradation requirements presented below. The material shall be composed of tough, durable particles, shall be reasonably free from thin, flat and elongated pieces, and shall contain no organic matter nor soft, friable particles in quantities considered objectionable by the Contracting Officer. The bedding material shall consist of 2A coarse aggregate Type B or better and conform to the quality and gradation requirements for No. 2A coarse aggregate as specified in Tables B and C of Section 703.2 of the Pennsylvania Department of Transportation Specification, Publication 408/2003, as shown on the Table below.

BEDDING LAYER GRADATION

U.S. Standard Sieve	% Passing By Weight
2-inches	100
3/4-inches	52-100
3/8-inches	36-70
No. 4	24-50
No. 16	10-30
No. 200	0-10

That portion of the material passing the No. 40 sieve shall be non-plastic.

PART 3 EXECUTION

3.1 FOUNDATION PREPARATION: Areas on which bedding layers are to be placed shall be trimmed and dressed to conform to cross sections shown on the drawings within an allowable tolerance of plus or minus 1 inch from the theoretical slope lines and grades. Where such areas are below the allowable minus tolerance limit they shall be brought to grade by filling with earth similar to the adjacent material and well compacted and no additional payment will be made for any material thus required. Immediately prior to placing the bedding, the prepared base will be inspected by the Contracting Officer and no material shall be placed thereon until that area has been approved.

3.2 BEDDING LAYER PLACEMENT: The bedding layer shall be placed on the designated area within the limits shown on the drawings to form a backing for the riprap protection. Bedding material shall be spread uniformly on the prepared base to the thickness as shown on the drawings. Placing of material by methods which will tend to segregate particle sizes within the bedding will not be permitted. Any damage to the surface of the bedding base during placing of the bedding shall be repaired before proceeding with the work. Compaction of the bedding layers will not be required but it shall be finished to present a reasonably even surface free from mounds or windrows.

3.3 RIPRAP PLACEMENT: Riprap shall be placed within the limits shown on the drawings or otherwise required by the Contracting Officer. Stone for "riprap" shall be placed on the bedding layer (where indicated) or geotextile in a manner as to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids, and shall be constructed within the specified tolerance to the lines and grades shown on the drawings. A tolerance, as specified below, from the slope lines and grades shown on the drawings will be allowed in the finished surface of the riprap, except that either extreme of such tolerance shall not be continuous over an area greater than 200 square feet. The tolerance limits for the riprap are plus 2 inches or minus 1 inch

for the R-4 riprap, and plus 4 inches or minus 2 inches for the R-7 riprap gradations. Riprap shall be placed to its full course thickness at one operation and in such a manner as to avoid displacing the bedding, geotextile, or underlying material. The larger stones shall be well distributed and the entire mass of stones in their final position shall be roughly graded to conform to the gradation specified in paragraph 2.1.2 above. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Placing riprap in layers will not be permitted. Placing riprap by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted. The desired distribution of the various sizes of stones throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placing, or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to obtain a reasonably well graded distribution of stone sizes as specified above. The Contractor shall maintain the riprap protection until accepted and any material displaced by any cause shall be replaced at his expense to the lines and grades shown on the drawings.

3.4 QUALITY CONTROL:

3.4.1 BEDDING MATERIALS: Materials to be used as bedding shall comply with the requirements above. Precautions must be used in the placement and spreading operations to prevent segregation and contamination of these materials. Continuous inspection shall be maintained during such operations and also during the placement operation, and when, in the opinion of the Contracting Officer, the material appears to be excessively segregated or contaminated, additional gradation tests shall be performed to determine the deviation from the required gradations. If, in the opinion of the Contracting Officer, segregation or contamination has occurred to the extent that the performance of the material may be adversely affected, the Contractor shall remove the unsatisfactory material and replace it with other material in such a way that requirements are satisfied, all at no additional cost to the Government. A minimum of one gradation test per 500 CY, or fraction thereof, of bedding material shall be made on samples which are at least 1 cubic foot in size, unless otherwise directed by the Contracting Officer to demonstrate compliance with the specified gradation and moisture requirements. Sampling and gradation testing shall be performed in accordance with ASTM D 75 and ASTM C 136 respectively.

3.4.2 STONE MATERIALS: Stone materials used for riprap shall conform to all stone quality testing requirements presented herein. In addition, a minimum of two gradation tests for R-7 riprap and one test for R-4 riprap shall be made on samples which are at least 15 tons in size, unless otherwise directed by the Contracting Officer, to demonstrate compliance with the specified gradation requirementsGradation testing shall be performed in accordance with ASTM D 5519, Test Method A.

3.4.3 STONE PLACEMENT RECORDS: At the time of completion of stone placement operations, prepare a document which graphically shows, for each stone size, the source of the stone for each reach and the time periods during which it was quarried and during which it was placed. Attachments to the document shall include a copy of the Contractor’s gradation data and test results for

each gradation range, photographs and negatives of the completed project structure, and testing data from the sources. Additional QC requirements are specified in paragraph 2.1.

3.5 MEASUREMENT AND PAYMENT: Measurement and payment for the work covered in this section will be in conformance with SECTION 01270: MEASUREMENT AND PAYMENT.

--- END OF SECTION ---

SECTION 02550

REPLACEMENT OF BITUMINOUS PAVING AND DENSE GRADED AGGREGATE (DGA) BASE COURSE

PART 1 GENERAL

1.1 Applicable Publication

Commonwealth of Pennsylvania, Department of Transportation Specifications, Publication 408/2003, Change No. 1, and addendum thereto, referred to herein as PADOT specifications.

1.2 Definitions

Reference to "Engineer" shall be interpreted to mean "Contracting Officer."

1.3 Measurement and Payment

Delete all references to MEASUREMENT and PAYMENT paragraphs. Measurement and payment for the work covered in this section shall be lump sum and shall be in conformance with Section 01270 MEASUREMENT AND PAYMENT.

1.4 Testing

All testing shall be done by an independent commercial testing laboratory at the Contractor's expense and responsibility.

1.5 SUBMITTALS

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

SD-09 Reports

Asphalt Mix Design; GA|ED.

Copies of job mix formula test results and reports 30 days prior to use on the project.

Density Testing; FIO

Samples for determining pavement densities.

Plant Control; GA|AR

Testing data.

Base Course Test Results; FIO

Testing data.

SD-13 Certificates

Tack Coat; FIO; Prime Coat; FIO

Certificate that coats meet specifications.

PART 2 MATERIALS

2.1 Bituminous Surface Course

The surface course shall conform to the requirements of Section 420, Bituminous Wearing Course, ID-2 of the PADOT specifications, except as modified herein. "Wearing course" shall be construed to mean "surface course."

2.2 Composition of Mixtures - Item 401.2(e)

The establishment of the job-mix formula and the plant control shall be performed by an independent recognized commercial testing laboratory at the Contractor's expense and responsibility. The finished mixture shall meet all of the PennDOT requirements for the specified mix including those for stability, flow, percentage of unfilled voids and percent VMA when tested in accordance with the PennDOT specifications.

The Contractor shall submit the asphalt mix design accompanied by test results attesting that the materials and properties selected shall produce a mixture of the specified qualities.

2.3 Bituminous Concrete Base Course

Bituminous Concrete Base Course shall conform to the requirements of Section 305, BITUMINOUS CONCRETE BASE COURSE, of the PADOT specifications.

2.4 Prime Coat

Prime coat shall meet the requirements of Section 461.

2.5 Tack Coat

Tack coat shall meet the requirements of Section 460.

2.6 Plant Control

The plant control, including the establishment of the actual mixing temperature, shall be performed by an independent recognized commercial testing laboratory at the Contractor's expense and responsibility. Hot-bin gradations shall be performed at a minimum of two-hour intervals and the composite gradation shall be calculated from the gradation of each hot bin. Based on these analyses, suitable adjustments shall be made to conform to the approved job-mix formula. A minimum of three Marshall specimens shall be molded per 270 tons of material placed or fraction thereof. Specimens shall be tested in accordance with the PennDOT specifications and the results furnished the Contracting Officer 24 hours after completion of the

testing.

2.7 Dense Graded Aggregate (DGA) Base Course Material

The Dense Graded Aggregate (DGA) Base Course material shall conform to the requirements of Section 350, SUBBASE. Material shall be Type B or better and conform to gradation No. 2A, as specified in Tables B and C of Section 703.2 Coarse Aggregate of the Pennsylvania Specifications.

PART 3 EXECUTION

3.1 Preparation of Existing Surface - Item 401.3(g)

3.1.1 Prime and Tack Coats

3.1.1.1 Prime Coat

A prime coat meeting the requirements of Section 461 shall be applied to all areas indicated on the drawings or directed by the Contracting Officer. Prime Coats are required if it will be at least seven (7) days before a surface layer is constructed on the underlying compacted material. The Contractor shall protect the underlying layer (base course, etc.) from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven (7) days, the choice of protection measures or actions to be taken is at the Contractor's option. Any damage or deterioration that occurs to the underlying material caused by lack of, or inadequate, protection shall be repaired (recompacted or replaced) as directed by the Contracting Officer at the Contractors expense and responsibility. When applying the prime coat, the prime coat shall be applied as soon as possible. All traffic, except for paving equipment used in the construction the surfacing, shall be prevented from using the underlying material, whether primed or not, until the surfacing is completed. Application rates shall range from 0.20 to 0.50 gallon per square yard. The actual application rate shall be determined by the Contracting Officer from the results of a trial strip. The prime coat shall be permitted to cure for a period of 48 hours or longer, as required by the Contracting Officer. The primed surface shall not be left uncovered long enough to permit it to loose its tackiness.

3.1.1.2 Tack Coat

A tack coat meeting the requirements of Section 460 shall be applied to all areas indicated on the drawings or directed by the Contracting Officer. Surfaces to receive a tack coat shall be free of excess dust and other loose material. Application rates shall range from 0.05 to 0.20 gallon per square yard. The actual application rate shall be determined by the Contracting Officer from the results of a trial strip. Work shall be planned so that no more tack coat than is necessary for the day's operation is placed on the surface. The tack coat shall be permitted to cure until the proper degree of tackiness, as determined by the Contracting Officer, has been obtained.

3.2 Pavement Density Testing

Density Acceptance - Item 401.3(j): Samples for determining pavement densities shall be taken with a coring machine or by cutting a 6-inch square out of the pavement. One set (three samples) shall be taken for every 300 tons of material placed. Density samples of the day's production should be taken and tested by noon of the following day and the results submitted to the Contracting Officer within 24 hours after completion of the testing. The bituminous course shall be compacted between 92% and 97% of Theor. Density.

3.3 Dense Graded Aggregate (DGA) Base Course

The Dense Graded Aggregate (DGA) Base Course shall conform to the requirements of paragraph Dense Graded Aggregate (DGA) Base Course Material. The Contractor shall submit to the Contracting Officer the results of gradation, liquid limit, plasticity index, wear, soundness, and laboratory moisture-density curves for each source of base course material.

3.3.1 Placement of Dense Graded Aggregate (DGA) Base Course

Compacted thickness of the DGA shall be as indicated. No layer shall be in excess of 8 inches nor less than 4 inches in compacted thickness. Each layer of DGA shall be compacted to 100 percent of laboratory maximum density in accordance with ASTM D 698 at the optimum moisture content.

3.3.2 Sampling and Testing

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing shall be permitted until the facilities have been inspected and approved. Tests shall be performed in sufficient numbers and at the locations and times directed to insure that materials and compaction meet specified requirements. The Contractor shall submit to the Contracting Officer base course test results within 24 hours of completion of the tests, to include the results of gradation, liquid limit, plasticity index, wear, soundness, and laboratory moisture-density curves for each source of base course material.

3.3.2.1 Base Course Test Results

Results shall verify that materials comply with this specification. When a material source is changed, the new material will be tested for compliance. When deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced or modified as directed by the Contracting Officer.

3.3.2.2 Sampling

Aggregate samples for laboratory tests shall be taken in accordance with ASTM D 75.

3.3.2.3 Sieve Analysis

Before starting work, at least one sample of DGA base course material shall be tested in accordance with ASTM C 136 and ASTM D 422 on sieves conforming to ASTM E 11. Additional tests shall be completed when a variation of the approved material is observed.

3.3.2.4 Liquid Limit and Plasticity Index

One liquid limit and plasticity index shall be performed for each sieve analysis. Liquid limit and plasticity index shall be in accordance with ASTM D 4318.

3.3.2.5 Laboratory Density

Tests shall provide a moisture-density relationship for the aggregate. Tests shall be conducted in accordance with ASTM D 698. Additional moisture-density curves shall be required if there is any change in gradation or particle shape.

3.3.3 Field Quality Control

3.3.3.1 Field Density

Field in-place density shall be determined in accordance with ASTM D 1556, ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked, and adjusted if necessary, using the sand cone method as described in paragraph Calibration of the ASTM publication. ASTM D 2922 results in a wet unit weight of soil, and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017. If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 at least once per every other lift for each 1000 square feet of base material. Calibration curves and calibration test results shall be furnished within 24 hours of the conclusion of the tests. At least one field density test shall be performed for each 100 square feet of each layer of base material. A minimum of one in-place density tests shall be performed per 50 linear feet or fraction thereof of trench per pavement and the test results submitted to the Contracting Officer.

3.3.3.2 Smoothness

Surface of each layer shall show no deviations in excess of 3/8 inch when tested with the 10-foot straightedge. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting, as directed.

3.3.3.3 Thickness Control

Compacted thickness of the base courses shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the

measured thickness is more than 1/4 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/8 inch of the thickness indicated. Thickness of the DGA base course shall be measured at intervals in such a manner as to ensure one measurement for each 250 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.4 Earthwork and Subgrade Preparation

Earthwork and Subgrade Preparation shall conform to SECTION 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

-- End of Section --

SECTION 02720

STORM-DRAINAGE SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 346/346R	(1990) Standard Specification for Cast-in-Place Nonreinforced Concrete Pipe and Recommendations

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-16	(1996) Standard Specifications for Highway Bridges
AASHTO M 167	(1994) Corrugated Steel Structural Plate, Zinc Coated, for Field Bolted Pipe
AASHTO M 190	(1988) Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 198	(1994) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M 219	(1992) Aluminum Alloy Structural Plate for Field Bolted Conduits
AASHTO M 243	(1994) Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 294	(1994) Corrugated Polyethylene Pipe, 305- to 915- mm 12-to 36 in. Diameter
AASHTO M 304	(1994) Poly(Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA-03	(1994) Manual for Railway Engineering

(Fixed Properties): Chapter 1, Roadway and Ballast

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A 112.14.1	(1975; R 1998) Backwater Valves

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 48	(1994a) Gray Iron Castings
ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 444	(1989) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Storm Sewer and Drainage Pipe
ASTM A 536	(1984; R 1993) Ductile Iron Castings
ASTM A 716	(1995) Ductile Iron Culvert Pipe
ASTM A 742	(1993) Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe
ASTM A 760	(1995a) Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A 762	(1995) Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A 798	(1994) Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM A 807	(1996) Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
ASTM A 849	(1994) Post Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B 26	(1996) Aluminum-Alloy Sand Castings
ASTM B 745	(1995) Corrugated Aluminum Pipe for Sewers and Drains
ASTM C 12	(1995) Installing Vitrified Clay Pipe Lines
ASTM C 14	(1995) Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 32	(1993) Sewer and Manhole Brick (Made from

	Clay or Shale)
ASTM C 55	(1995) Concrete Building Brick
ASTM C 62	(1996) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 76	(1995) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 139	(1995) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 231	(1991b) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 270	(1996a) Mortar for Unit Masonry
ASTM C 425	(1995) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(1994) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(1994) Precast Reinforced Concrete Manhole Sections
ASTM C 506	(1995) Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C 507	(1995a) Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
ASTM C 655	(1994) Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C 700	(1996) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C 789	(1994) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM C 850	(1994) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Ft. of Cover Subjected to Highway Loadings
ASTM C 877	(1994) External Sealing Bands for Noncircular Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM D 1056	(1991) Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM D 1171	(1994) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1992) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1784	(1992) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2321	(1989; R 1995) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2922	(1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1993) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3034	(1994) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1992) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3350	(1993) Polyethylene Plastics Pipe and Fittings Materials
ASTM F 477	(1995) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 679	(1995) Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F 714	(1994) Polyethylene (PE) Plastic Pipe

	(SDR-PR) Based on Outside Diameter
ASTM F 794	(1995a) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 894	(1995) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 949	(1994) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

1.2 MEASUREMENT AND PAYMENT

Measurement and payment will be made in accordance with Section 01270 MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

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

SD-06 Instructions

Placing Pipe; FIO.

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

SD-13 Certificates

Resin Certification; FIO. Frame and Cover for Gratings; FIO.

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

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Gasket materials and plastic materials shall be protected from exposure to the direct sunlight over extended periods.

1.4.2 Handling

Materials shall be handled in such a manner as to ensure delivery to the

trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

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

2.1.1 Concrete Pipe

ASTM C 76, Class IV.

2.1.2 PVC Pipe

The pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe in accordance with AASHTO M 304, shall be submitted prior to installation of the pipe.

2.1.2.1 Type PSM PVC Pipe

ASTM D 3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.3 PE Pipe

The pipe manufacturer's resin certification indicating the cell classification of PE used to manufacture the pipe shall be submitted prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D 3350.

2.1.3.1 Smooth Wall PE Pipe

ASTM F 714, maximum DR of 21 for pipes 3 to 24 inches in diameter and maximum DR of 26 for pipes 26 to 48 inches in diameter. Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335434C.

2.1.3.2 Corrugated PE Pipe

AASHTO M 294, Type S, produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 315412C or 324420C. Pipe walls shall have the following properties:

Nominal Size (in.)	Minimum Wall Area (square in/ft)	Minimum Moment of Inertia of Wall Section (in to the 4th/in)
12	1.50	0.024

Nominal Size (in.)	Minimum Wall Area (square in/ft)	Minimum Moment of Inertia of Wall Section (in to the 4th/in)
15	1.91	0.053
18	2.34	0.062
24	3.14	0.116
30	3.92	0.163
36	4.50	0.222

2.2 VALVES

2.2.1 Backwater Valves

Backwater valves shall conform to ASME A 112.14.1. Backwater valves shall have cast-iron bodies with cleanouts large enough to permit removal of interior parts. Valves shall be of the flap type, hinged or pivoted, with revolving disks. Hinge pivots, disks, and seats shall be nonferrous metal. Disks shall be slightly open in a no-flow no-backwater condition. Cleanouts shall extend to finished grade and be fitted with threaded countersunk plugs. Backwater valves shall be installed at the locations shown on the drawings.

2.3 DRAINAGE STRUCTURES

2.3.1 Precast Reinforced Concrete Box

For highway loadings with 2 feet of cover or more or subjected to dead load only, ASTM C 789; for less than 2 feet of cover subjected to highway loading, ASTM C 850.

2.4 MISCELLANEOUS MATERIALS

2.4.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4,000 psi concrete under Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inchesthick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inchesbetween steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.4.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick

or block construction shall conform to ASTM C 270, Type M, except the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 5 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.4.3 Precast Reinforced Concrete Manholes

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

2.4.4 Frame and Cover for Gratings

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

2.4.5 Joints

2.4.5.1 Flexible Joints

a. Materials: Flexible joints shall be made with plastic or rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.

2.4.5.2 Flexible Gasketed Joints

a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 7 inches wide and approximately 3/8 inch thick, meeting the requirements of ASTM D 1056, Type 2 A1, and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 13/16 inch in diameter for pipe diameters of 36 inches or smaller and 7/8 inch in diameter for larger pipe having 1/2 inch deep end corrugation. Rubber O-ring gaskets shall be 1-3/8 inches in diameter for pipe having 1 inch deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C 443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

2.4.5.3 PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer. Couplings and fittings shall be recommended by the pipe manufacturer.

2.4.5.4 Smooth Wall PE Plastic Pipe

Pipe shall be joined using butt fusion method as recommended by the pipe manufacturer. Couplings and fittings shall be recommended by the pipe manufacturer.

2.4.5.5 Corrugated PE Plastic Pipe

Water tight joints shall be made using a PVC or PE coupling and rubber gaskets as recommended by the pipe manufacturer. Rubber gaskets shall conform to ASTM F 477. Soil tight joints shall conform to the requirements in AASHTO HB-16, Division II, Section 26.4.2.4. (e) for soil tightness and shall be as recommended by the pipe manufacturer. Couplings and fittings shall be recommended by the pipe manufacturer.

2.5 STEEL LADDER

Steel ladder shall be provided where the depth of the manhole exceeds 12 feet. These ladders will be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inchesapart. The two stringers shall be a minimum 3/8 inch thick and 2-1/2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123.

PART 3 EXECUTION

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

Excavation of trenches and for appurtenances and backfilling for culverts and storm drains shall be in accordance with the applicable portions of Section 02221 EXCAVATION, TRENCHING, AND BACKFILLING FOR STRUCTURES and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 12 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing where required shall be placed within the trench width as specified. Care shall be taken not to overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures shall be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 02221 EXCAVATION, TRENCHING, AND BACKFILLING FOR STRUCTURES.

3.1.3 Removal of Unstable Material

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

3.2 BEDDING

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

3.2.1 Concrete Pipe

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded carefully in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type of joint.

3.2.2 Plastic Pipe

Bedding for PVC and PE pipe shall meet the requirements of ASTM D 2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

3.3 PLACING PIPE

Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to the direct sunlight prior to laying as needed to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same

vertical plane as the major axis of the pipe. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed plastic pipe shall not exceed 4.5 percent of the nominal inside diameter. After backfilling has been completed, the Government may perform a deflection test on the entire length of installed plastic pipeline using a mandrel or other suitable device. Any plastic pipe showing deflections in excess of 4.5 percent shall be removed and replaced at the Contractor's expense. All pipe in place shall be inspected before backfilling, and those pipes damaged during placement shall be removed and replaced.

3.3.1 Concrete and PVC Pipe

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

3.3.2 Corrugated PE Pipe

Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's recommendations.

3.4 JOINTS

3.4.1 Concrete Pipe

3.4.1.1 Flexible Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete, precast concrete segmental blocks, prefabricated corrugated metal, or bituminous coated corrugated metal, complete with frames and covers or gratings and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STEEL LADDER INSTALLATION

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

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

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

3.7.2 Backfilling Pipe in Fill Sections

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

3.7.3 Movement of Construction Machinery

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

3.7.4 Compaction

3.7.4.1 General

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

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density (densities) which will be determined as specified in this paragraph.

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

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

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

3.7.5 Determination of Density

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

moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

-- End of Section --

SECTION 02921

SEEDING
06/98

1 GENERAL

1.1 REFERENCES

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

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01	(Aug 95) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 977	(1991) Emulsified Asphalt
ASTM D 2028	(1976; R 1992) Cutback Asphalt (Rapid-Curing Type)
ASTM D 4972	(1995a) pH of Soils
ASTM D 5268	(1992; R 1996) Topsoil Used for Landscaping Purposes
ASTM D 5883	(1996) Standard Guide for Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 SUBMITTALS

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

SD-01 Data

Equipment; FIO. Surface Erosion Control Material; FIO. Chemical Treatment Material; FIO.

Manufacturer's literature including physical characteristics, application and installation instructions for equipment, surface erosion control material and chemical treatment material.

SD-07 Schedules

Equipment; FIO.

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

SD-08 Statements

Delivery; FIO.

Delivery schedule.

Finished Grade and Topsoil; FIO.

Finished grade status.

Topsoil; GA|ED.

Availability of topsoil from the stripping and stock piling operation.

SD-09 Reports

Equipment Calibration; FIO.

Certification of calibration tests conducted on the equipment used in the seeding operation.

Soil Test; GA|ED.

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-13 Certificates

Seed; GA|ED. Topsoil; GA|ED. pH Adjuster; GA|ED. Fertilizer; GA|ED. Organic Material; GA|ED. Soil Conditioner; GA|ED. Mulch; GA|ED.

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

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

b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

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

d. Fertilizer. Chemical analysis and composition percent.

e. Organic Material: Composition and source.

f. Soil Conditioner: Composition and source.

g. Mulch: Composition and source.

SD-14 Samples

Delivered Topsoil; GA|ED.

Samples taken from several locations at the source.

Soil Amendments; GA|ED.

A 4.5 kilogram 10 pound sample.

Mulch; GA|ED.

A 4.5 kilogram 10 pound sample.

SD-18 Records

Quantity Check; FIO.

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

Seed Establishment Period; FIO.

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record; FIO.

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

1.3 SOURCE INSPECTION

The source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

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

1.4.1.1 Delivered Topsoil

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

1.4.1.2 Soil Amendments

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

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 40 mm 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.4.4 Handling

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

1.4.5 Time Limitation

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

2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws.

2.1.2 Permanent Seed Species and Mixtures

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

Botanical Name	Common Name	Rate	Percent Pure Live Seed
	LAWN SEED		
Festuca Longifolia	Hard Fescue Reliant or improved variety from latest State Agronomy mimeo	4.5 lbs. per 1000 sq. ft.	83% min.

2.1.3 Temporary Seed Species

Temporary seed species for surface erosion control or overseeding shall be as follows:

Botanical Name	Common Name	Rate	Percent Pure Live Seed
Lolium perene	Perenial rye	6-8 lbs/AC	85%min

2.1.4 Quality

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

2.1.5 Seed Mixing

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

2.1.6 Substitutions

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

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02200 STRIPPING AND EXCAVATION. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the seed specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 40 mm 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, sulfur, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a 2.36 mm No. 8 sieve and a minimum 55 percent shall pass through a 0.250 mm No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a 2.36 mm No. 8 sieve and a minimum 97 percent shall pass through a 0.250 mm No. 60 sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a 2.36 mm No. 8 sieve and a minimum 35 percent shall pass through a 0.250 mm No. 60 sieve.

2.3.2 Fertilizer

It shall be as recommended by the soil test. Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.3 Nitrogen Carrier Fertilizer

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

2.3.4 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.4.1 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. It shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.3.4.2 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings, or other wood waste material that is free of stones, sticks, soil, and toxic substances harmful to plants, and is fully composted or stabilized with nitrogen.

2.3.4.3 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 10 mm 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The

material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 50 mm 2 inches in length.

2.3.4.4 Worm Castings

Worm castings shall be screened from worms and food source, and shall be commercially packaged.

2.3.5 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for use singly or in combination to meet the requirements of the soil test.

2.3.5.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a 2 mm No. 10 sieve and a minimum 10 percent by weight shall pass a 1.18 mm No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.5.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized and applied according to the manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide, with an absorption capacity of 250-400 times its weight. Polymers shall also be added to the seed and be a starch grafted polyacrylonitrite, with graphite added as a tacky sticker. It shall have an absorption capacity of 100 plus times its weight.

2.3.5.3 Calcined Clay

Calcined clay shall be granular particles produced from montmorillonite clay calcined to a minimum temperature of 650 degrees C. 1200 degrees F. Gradation: A minimum 90 percent shall pass a 2.36 mm No. 8 sieve; a minimum 99 percent shall be retained on a 0.250 mm No. 60 sieve; and a maximum 2 percent shall pass a 0.150 mm No. 100 sieve. Bulk density: A maximum 640 kilogram per cubic meter 40 pounds per cubic foot.

2.3.5.4 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.3.5.5 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.4 MULCH

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

2.4.1 Straw

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

2.4.2 Hay

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

2.4.3 Wood Cellulose Fiber

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

2.4.4 Paper Fiber

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.

2.5 WATER

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

2.6 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.6.1 Surface Erosion Control Blanket

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

2.6.2 Surface Erosion Control Fabric

Fabric shall be knitted construction of polypropylene yarn with uniform mesh openings 19 to 25 mm 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall have a minimum life of 6 months.

2.6.3 Surface Erosion Control Net

Net shall be heavy, twisted jute mesh, weighing approximately 605 grams per meter 1.22 pounds per linear yard and 1200 mm 4 feet wide with mesh openings of approximately 25 mm 1 inch square.

2.6.4 Surface Erosion Control Chemicals

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

2.6.5 Hydrophilic Colloids

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

2.6.6 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from Apr 15 to Jun 15 for spring establishment; and from Sep 01 to Nov 15 for fall establishment.

3.1.2 Seeding Conditions

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

3.1.3 Equipment Calibration

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

3.1.4 Soil Test

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection on site shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the seed species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

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

requirements have been completed in accordance with Section 02200 STRIPPING AND EXCAVATION, prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying pH Adjuster

The pH adjuster shall be applied as recommended by the soil test. The pH adjuster shall be incorporated into the soil to a maximum 100 mm 4 inch depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The fertilizer shall be applied as recommended by the soil test. Fertilizer shall be incorporated into the soil to a maximum 100 mm 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation.

3.2.2.3 Applying Soil Conditioner

The soil conditioner shall be as recommended by the soil test. The soil conditioner shall be spread uniformly over the soil a minimum 25 mm 1 inch depth and thoroughly incorporated by tillage into the soil to a maximum 100 mm 4 inch depth.

3.2.2.4 Applying Super Absorbent Polymers

Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 100 mm 4 inch depth.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 100 mm 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 50 mm 2 inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 25 mm 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Lawn Area Debris

Debris and stones over a minimum 16 mm 5/8 inch in any dimension shall be removed from the surface.

3.2.4.3 Protection

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

3.3 INSTALLATION

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

3.3.1 Installing Seed

Seeding method shall be Broadcast Seeding, Drill Seeding or Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate specified in subparagraph "Permanent Seed Species and Mixtures"using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 6 mm 1/4 inch depth by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.1.2 Drill Seeding

Seed shall be uniformly drilled to a maximum 13 mm 1/2 inch depth and at the rate specified in subparagraph "Permanent Seed Species and Mixtures", using equipment having drills a maximum 175 mm 7 inches distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

3.3.1.3 Rolling

The entire area shall be firmed with a roller not exceeding 130 kilograms per meter 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rate specified in subparagraph "Permanent Seed Species and Mixtures". Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Wood cellulose fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. Slurry shall be

uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

3.3.3 Mulching

3.3.3.1 Hay or Straw Mulch

Hay or straw mulch shall be spread uniformly at the rate of 0.75 metric tons per hectare 2 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.3.2 Mechanical Anchor

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

3.3.3.3 Non-Asphaltic Tackifier

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

3.3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

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

3.3.4 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 25 mm 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

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

3.4.2 Temporary Seeding

The application rate shall be as specified in subparagraph "Temporary Seed Species". When directed during contract delays affecting the seeding

operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded in accordance with temporary seed species listed under Paragraph SEED.

3.4.2.1 Soil Amendments

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

3.4.2.2 Remaining Soil Amendments

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

3.5 QUANTITY CHECK

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

3.6 RESTORATION AND CLEAN UP

3.6.1 Restoration

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

3.6.2 Clean Up

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

3.7 PROTECTION OF INSTALLED AREAS

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

3.8 SEED ESTABLISHMENT PERIOD

3.8.1 Commencement

The seed establishment period to obtain a healthy stand of grass plants shall begin on the first day of work under this contract and shall end 3 months after the last day of the seeding operation. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.8.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health when the grass plants are a minimum 25 mm 1 inch high.

3.8.2.1 Lawn Area

A satisfactory stand of grass plants from the seeding operation for a lawn area shall be a minimum 200 grass plants per square meter 20 grass plants per square foot. Bare spots shall be a maximum [150] [230] mm 6 inches square. The total bare spots shall be a maximum 2 percent of the total seeded area.

3.8.3 Maintenance During Establishment Period

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

3.8.3.1 Mowing

a. Lawn Areas: Lawn areas shall be mowed to a minimum 75 mm 3 inch height when the turf is a maximum 100 mm 4 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.8.3.2 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. A maximum 4 kilograms per hectare 1/2 pound per 1000 square feet of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.8.3.3 Repair or Reinstall

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

3.8.3.4 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

END

SECTION 03101

FORMWORK FOR CONCRETE

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 347R	(1994) Guide for Formwork for Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31	(1994) Making and Curing Concrete Test Specimens in the Field
ASTM C 39	(1993a) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 1074	(1993) Estimating Concrete Strength by the Maturity Method
ASTM C 1077	(1995a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1983) Construction and Industrial Plywood

1.2 DESIGN REQUIREMENTS

The design, engineering, and construction of the formwork shall be the responsibility of the Contractor. The formwork shall be designed for anticipated live and dead loads and shall comply with the tolerances specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph CONSTRUCTION TOLERANCES. The formwork shall be designed as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. The adequacy of formwork design and construction shall be monitored prior to and during concrete placement as part of the Contractor's approved Quality Control Plan.

1.3 SUBMITTALS

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

SD-01 Data

Materials; FIO.

Manufacturer's literature shall be submitted for plywood, concrete form hard board, form accessories, prefabricated forms, form coating, and form-lining materials.

SD-04 Drawings

Shop Drawings; FIO.

Drawings and design computations for all formwork required shall be submitted at least 7 days either before fabrication on site or before delivery of prefabricated forms.

SD-09 Reports

Inspection; FIO.

The Contractor shall submit field inspection reports for concrete forms and embedded items.

Formwork Not Supporting the Weight of Concrete; GA.

If forms are to be removed in less than 24 hours on formwork not supporting the weight of concrete, the evaluation and results of the control cylinder tests or maturity instrumentation shall be submitted to and approved before the forms are removed.

1.4 SHOP DRAWINGS

The shop drawings and data submitted shall include the type, size, quantity, and strength of all materials of which the forms are made, the plan for jointing of facing panels, details affecting the appearance, and the assumed design values and loading conditions.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Forms and Form Liners

Forms and form liners shall be fabricated with facing materials that will produce a finish meeting the specified construction tolerance requirements and the following surface classifications as defined in ACI 347R.

2.1.1.1 Class "B" Finish

This class of finish shall apply to all surfaces except those specified to receive Class D. The form facing material shall be composed of tongue-and-groove or shiplap lumber, plywood conforming to DOC PS 1, Grade B-B concrete form, tempered concrete form hard board or steel. Steel lining on wood sheathing will not be permitted.

2.1.1.2 Class "D" Finish

This class of finish shall apply to where indicated. The form facing may be of wood or steel.

2.1.2 Form Coating

Form coating shall be commercial formulation that will not bond with, stain, cause deterioration, or any other damage to concrete surfaces. The coating shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. If special form liners are to be used, the Contractor shall follow the recommendation of the form coating manufacturer.

2.2 ACCESSORIES

Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufactured type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 2 inches from any concrete surface either exposed to view or exposed to water. Removable tie rods shall not be allowed at concrete wall at substation. Plastic snap ties may be used in locations where the surface will not be exposed to view. Form ties shall be constructed so that the ends or end fasteners can be removed without spalling the concrete.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Form Construction

Forms shall be constructed true to the structural design and required alignment. The form surface and joints shall be mortar tight and supported to achieve safe performance during construction, concrete placement, and form removal. The Contractor shall continuously monitor the alignment and stability of the forms during all phases to assure the finished product will meet the required surface classes specified in paragraph FORMS AND FORM LINERS and tolerances specified in paragraph DESIGN REQUIREMENTS. Failure of any supporting surface either due to surface texture, deflection or form collapse shall be the responsibility of the Contractor as will the replacement or correction of unsatisfactory surfaces. When forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of defects which would impair the quality of the resulting concrete surface. All surfaces of used forms shall be cleaned of

mortar and any other foreign material before reuse.

3.1.2 Chamfering

All exposed joints, edges and external corners shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with concrete surfaces. Chamfered joints shall be terminated twelve inches outside the limit of the earth or rockfill so that the end of the chamfers will be clearly visible.

3.1.3 Coating

Forms for exposed or painted surfaces shall be coated with form oil or a form-release agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that, in cold weather when freezing temperatures are anticipated, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.2 FORM REMOVAL

Forms shall not be removed without approval. The minimal time required for concrete to reach a strength adequate for removal of formwork without risking the safety of workers or the quality of the concrete depends on a number of factors including, but not limited to, ambient temperature, concrete lift heights, type and amount of concrete admixture, and type and amount of cementitious material in the concrete. It is the responsibility of the Contractor to consider all applicable factors and leave the forms in place until it is safe to remove them. In any case forms shall not be removed unless the minimum time, minimum ambient temperature, and minimum compressive strength requirements below are met, except as otherwise directed or specifically authorized. When conditions are such as to justify the requirement, forms will be required to remain in place for a longer period. All removal shall be accomplished in a manner which will prevent damage to the concrete and ensure the complete safety of the structure. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements. Evidence that concrete has gained sufficient strength to permit removal of forms shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24 hours. All control cylinders shall be prepared and tested in accordance with ASTM C 31 and ASTM C 39 at the expense of the Contractor by an independent laboratory that complies with ASTM C 1077 and shall be tested within 4 hours after removal from the site.

3.2.1 Formwork Not Supporting Weight of Concrete

Formwork for walls, columns, sides of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed.

3.2.2 Formwork Supporting Weight of Concrete

Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected.

3.3 INSPECTION

Forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

-- End of Section --

SECTION 03150

EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 920	(1995) Elastomeric Joint Sealants
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2628	(1991) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D 2835	(1989; R 1993) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

1.2 SUBMITTALS

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

SD-09 Reports

Premolded Expansion Joint Filler Strips; FIO. Compression Seals and Lubricant; FIO.

Certified manufacturer's test reports shall be provided for premolded expansion joint filler strips and compression seals and lubricant to verify compliance with applicable specification.

SD-14 Samples

Field Molded Sealants and Primer; FIO.

One gallon of field-molded sealant and one quart of primer (when primer is recommended by the sealant manufacturer) shall be provided for testing.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Premolded Expansion Joint Filler Strips

Premolded expansion joint filler strips shall conform to ASTM D 1751 or ASTM D 1752, Type I, or resin impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.1.2 Joint Seals and Sealants

2.1.2.1 Field Molded Sealants and Primer

Field molded sealants and primer shall conform to ASTM C 920, Type M, Grade NS, Class 25, use NT for vertical joints and Type M, Grade P, Class 25, use T for horizontal joints. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, nonshrink, nonreactive with sealant, and nonabsorptive material type such as extruded butyl or polychloroprene foam rubber.

2.1.2.2 Compression Seals and Lubricant

Compression seals shall conform to ASTM D 2628; lubricant for installation shall conform to ASTM D 2835.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.2.1 Materials Tests

2.2.1.1 Field-Molded Sealants

Samples of sealant and primer, when use of primer is recommended by the manufacturer, as required in paragraph FIELD MOLDED SEALANTS AND PRIMER, shall be tested by and at the expense of the Government for compliance with paragraph FIELD MOLDED SEALANTS AND PRIMER. If the sample fails to meet specification requirements, new samples shall be provided and the cost of retesting will be deducted from payments due the Contractor.

PART 3 EXECUTION

3.1 INSTALLATION

Joint locations and details, including materials and methods of installation of joint fillers, shall be as specified, as shown, and as directed. In no case shall any fixed metal be continuous through an expansion or contraction joint.

3.1.1 Expansion Joints

Premolded filler strips shall have oiled wood strips secured to the top thereof and shall be accurately positioned and secured against displacement to clean, smooth concrete surfaces. The wood strips shall be slightly tapered, dressed and of the size required to install filler strips at the desired level below the finished concrete surface and to form the groove for the joint sealant or seals to the size shown. Material used to secure premolded fillers and wood strips to concrete shall not harm the concrete and shall be compatible with the joint sealant or seals. The wood strips shall not be removed until after the concrete curing period. The groove shall be thoroughly cleaned of all laitance, curing compound, foreign materials, protrusions of hardened concrete and any dust which shall be blown out of the groove with oil-free compressed air.

3.1.1.1 Joints With Field-Molded Sealant

Joints shall not be sealed when the sealant, air or concrete temperature is less than 40 degrees F. Immediately prior to installation of field molded sealants, the joint shall be cleaned of all debris and further cleaned using water, chemical solvents or other means as recommended by the sealant manufacturer. The joints shall be dry prior to filling with sealant. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's recommendations.

3.1.1.2 Joints With Preformed Compression Seals

The joint seals shall be installed with equipment which shall be capable of installing joint seals to the prescribed depth without cutting, nicking, twisting, or otherwise distorting or damaging the seal and with no more than five percent stretching of the seal. The sides of the joint and, if necessary, the sides of the compression seal shall be covered with a coating of lubricant, and the seal shall be installed to the depth indicated with joint installation equipment. Butt joints shall be coated with liberal applications of lubricant.

3.1.2 Contraction Joints

Joints requiring a bond breaker shall be coated with curing compound or with bituminous paint.

-- End of Section --

SECTION 03210

STEEL BARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 315	(1995) ACI Detailing Manual: Section Details and Detailing of Concrete Reinforcement
ACI 318/318R	(1995) Building Code Requirements for Reinforced Concrete
ACI 318M/318RM	(1995) Building Code Requirements for Reinforced Concrete (Metric)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 184/A 184M	(1996) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	(1994) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 370	(1995a) Mechanical Testing of Steel Products
ASTM A 497	(1995) Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 616/A 616M	(1996) Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 617/A 617M	(1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 706/A 706M	(1996b) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 767/A 767M	(1990) Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

ASTM A 775/A 775M	(1996) Epoxy-Coated Reinforcing Steel Bars
ASTM E 94	(1993) Radiographic Testing

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4	(1992) Structural Welding Code - Reinforcing Steel

1.2 SUBMITTALS

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

SD-04 Drawings

Fabrication and Placement; GA.

The Contractor shall submit shop drawings which include: reinforcement steel placement drawings; reinforcement steel schedules showing quantity, size, shape, dimensions, weight per foot, total weights and bending details; and details of bar supports showing types, sizes, spacing and sequence.

SD-09 Reports

Materials; GA. Tests, Inspections, and Verifications; GA.

Certified tests reports of reinforcement steel showing that the steel complies with the applicable specifications shall be furnished for each steel shipment and identified with specific lots prior to placement. Three copies of the heat analyses shall be provided for each lot of steel furnished and the Contractor shall certify that the steel conforms to the heat analyses.

SD-18 Records

Material; FIO.

A system of identification which shows the disposition of specific lots of approved materials in the work shall be established and submitted before completion of the contract.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the following requirements.

2.1.1 Steel Bars

Steel bars shall comply with the requirements of ASTM A 615/A 615M, deformed, of the grades, sizes and lengths shown.

2.1.1.1 Fabricated Bar Mats

Fabricated bar mats shall comply with the requirements of ASTM A 184/A 184M, clipped or welded mats, bar sizes and spacings as shown.

2.1.2 Steel Welded Wire Fabric

Steel welded wire fabric shall comply with the requirements of ASTM A 185, wire sizes and spacings as shown.

2.1.3 Accessories

2.1.3.1 Bar Supports

Bar supports shall comply with the requirements of ACI 315. Supports for bars in concrete with formed surfaces exposed to view shall be plastic-coated wire, stainless steel or precast concrete supports. Precast concrete supports shall be wedged-shaped, not larger than 3-1/2 by 3-1/2 inches, of thickness equal to that indicated for concrete cover and have an embedded hooked tie-wire for anchorage. Bar supports used in precast concrete with formed surfaces exposed to view shall be the same quality, texture and color as the finish surfaces.

2.1.3.2 Wire Ties

Wire ties shall be 16 gage or heavier black annealed wire.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

The Contractor shall have material tests required by applicable standards and specified performed by an approved laboratory and certified to demonstrate that the materials are in conformance with the specifications. tests, inspections, and verifications shall be performed and certified at the Contractor's expense.

2.2.1 Reinforcement Steel Tests

Mechanical testing of steel shall be in accordance with ASTM A 370 except as otherwise specified or required by the material specifications. Tension tests shall be performed on full cross-section specimens using a gage length that spans the extremities of specimens with welds or sleeves included. Chemical analyses of steel heats shall show the percentages of carbon, phosphorous, manganese, sulphur and silicon present in the steel.

PART 3 EXECUTION

3.1 FABRICATION AND PLACEMENT

Reinforcement steel and accessories shall be fabricated and placed as specified and shown and approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown shall be in

accordance with ACI 315 and ACI 318/318R or as directed. Steel shall be fabricated to shapes and dimensions shown, placed where indicated within specified tolerances and adequately supported during concrete placement. At the time of concrete placement all steel shall be free from loose, flaky rust, scale (except tight mill scale), mud, oil, grease or any other coating that might reduce the bond with the concrete.

3.1.1 Hooks and Bends

Steel bars shall be mill or field-bent. All steel shall be bent cold unless authorized. No steel bars shall be bent after being partially embedded in concrete unless indicated or authorized.

3.1.2 Placing Tolerances

3.1.2.1 Spacing

The spacing between adjacent bars and the distance between layers of bars may not vary from the indicated position by more than one bar diameter nor more than 1 inch.

3.1.2.2 Concrete Cover

The minimum concrete cover of main reinforcement steel bars shall be as shown. The allowable variation for minimum cover shall be as follows:

MINIMUM COVER	VARIATION
6 inch	plus 1/2 inch
4 inch	plus 3/8 inch
3 inch	plus 3/8 inch
2 inch	plus 1/4 inch
1-1/2 inch	plus 1/4 inch
1 inch	plus 1/8 inch
3/4 inch	plus 1/8 inch

3.1.3 Splicing

Splices in steel bars shall be made only as required. Bars may be spliced at alternate or additional locations at no additional cost to the Government subject to approval.

3.1.3.1 Lap Splices

Lap splices shall be used only for bars smaller than size 14 and welded wire fabric. Lapped bars may be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than 1/5 the required length of lap or 6 inches.

-- End of Section --

SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only and represent the latest edition in force when this contract is awarded.

ACI INTERNATIONAL (ACI)

ACI 117/117R	Standard Tolerances for Concrete Construction and Materials
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214.3R	Simplified Version of the Recommended Practice for Evaluation of Strength Test Results
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 318/318R	Building Code Requirements for Reinforced Concrete and Commentary

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	Burlap Cloth Made From Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31	Making and Curing Concrete Test Specimens in the Field
ASTM C 33	Concrete Aggregates
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	Obtaining and Testing Drilled Cores and

	Sawed Beams of Concrete
ASTM C 78	Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
ASTM C 94	Ready-Mixed Concrete
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143	Slump of Hydraulic Cement Concrete
ASTM C 150	Portland Cement
ASTM C 171	Sheet Materials for Curing Concrete
ASTM C 172	Sampling Freshly Mixed Concrete
ASTM C 192	Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Air-Entraining Admixtures for Concrete
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 441	Standard Test Method for Effectiveness of Mineral Admixtures or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
ASTM C 494	Chemical Admixtures for Concrete
ASTM C 618	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM C 881	Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 940	Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM C 989	Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1017	Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059	Latex Agents for Bonding Fresh to Hardened

	Concrete
ASTM C 1064	Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D 75	Sampling Aggregates
ASTM D 1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

CORPS OF ENGINEERS (COE)

COE CRD-C 94	Surface Retarders
COE CRD-C 104	Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA TMMB-01	Truck Mixer Agitator and Front Discharge Concrete Carrier Standards of the Truck Mixer Manufacturers Bureau
NRMCA QC 3	Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

1.2 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered in this section will be in conformance with the applicable sections of Specification Section 01270. Under this type of contract concrete items will be paid for by lump sum and will not be measured. The work covered by these items consists of furnishing all concrete materials, reinforcement, miscellaneous embedded materials, and equipment, and performing all labor for the forming,

manufacture, transporting, placing, finishing, curing, and protection of concrete in these structures.

1.3 SUBMITTALS

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

SD-08 Statements

Mixture Proportions; GA|ED.

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of each strength or class of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. The test results shall be less than 6 months old. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

SD-09 Reports

Testing and Inspection for Contractor Quality Control; GA|ED.

Certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, aggregate, admixtures, and curing compound proposed for use on this project.

SD-13 Certificates

Qualifications; GA|ED.

Written documentation for Contractor Quality Control personnel.

SD-14 Samples

Surface Retarder; GA|ED.

Surface retarder material with manufacturer's instructions for application in conjunction with air-water cutting.

1.4 QUALIFICATIONS

Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) Certified Workmen in one of the

following grades or shall have written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade I
Concrete Laboratory Testing Technician, Grade I or II
Concrete Construction Inspector, Level II

The foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation.

1.5 SPECIAL REQUIREMENTS

A pre-installation meeting with the Contracting Officer will be required at least 10 days prior to start of construction. The Contractor shall be responsible for calling the meeting; the Project Superintendent and active installation personnel shall be present.

1.6 GENERAL REQUIREMENTS

1.6.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117/117R.

1.6.2 Strength Requirements and w/c Ratio

1.6.2.1 Strength Requirements

Specified compressive strength (f'c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
3000 psi at 28 days (PennDOT Class A)	Type C and M inlets
4000 psi at 28 days	All other concrete

a. Evaluation of Concrete Compressive Strength. Compressive strength specimens (6 by 12 inch cylinders) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

b. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the

specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. The Contractor shall perform the coring, test the cores, and repair the holes unless otherwise indicated by the Contracting Officer.

c. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318/318R. Concrete work evaluated by structural analysis or by results of a load test as being under strength shall be corrected in a manner satisfactory to the Contracting Officer. All investigations, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and must be approved by the Contracting Officer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

1.6.2.2 Water-Cement Ratio

Maximum water-cement ratio (w/c) for normal weight concrete shall be as follows:

WATER-CEMENT RATIO, BY WEIGHT	STRUCTURE OR PORTION OF STRUCTURE
0.50 (PennDOT Class A)	Type C and M inlets
0.45	All other concrete

These w/c's may cause higher strengths than that required above for compressive strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where GGBF slag is used, the weight of the GGBF slag shall be included in the equations of ACI 211.1 for the term P which is used to denote the weight of pozzolan.

1.6.3 Air Entrainment

All concrete shall be air entrained to contain between 5 and 7 percent total air. Specified air content shall be attained at point of placement into the forms. Air content for concrete shall be determined in accordance with ASTM C 231.

1.6.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be 2 inches plus or minus 1 inch. Slump shall be determined in accordance with ASTM C 143.

When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump not exceeding 3 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

1.6.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.6.6 Size of Coarse Aggregate

The largest feasible nominal maximum size aggregate (NMSA) specified in paragraph AGGREGATES shall be used in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.6.7 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.6.8 Technical Service for Specialized Concrete

The services of a factory trained technical representative shall be obtained to oversee proportioning, batching, mixing, placing, consolidating, and finishing of specialized structural concrete, such as flowing concrete. The technical representative shall be on the job full time until the Contracting Officer is satisfied that field controls indicate concrete of specified quality is furnished and that the Contractor's crews are capable of continued satisfactory work. The technical representative shall be available for consultation with, and advice to, Government forces.

1.7 MIXTURE PROPORTIONS

Concrete shall be composed of Type II portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.7.1 Proportioning Studies for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192 and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test reports indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratios required in the paragraph Maximum Allowable w/c Ratio will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where GGBF slag is used, the weight of the GGBF slag shall be included in the equations in ACI 211.1 for the term P, which is used to denote the weight of pozzolan. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent. Laboratory trial mixtures shall be designed for maximum permitted slump and air content. Separate sets of trial mixture studies shall be made for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days in accordance with ASTM C 39. From these test results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, a curve shall be plotted showing the relationship between 7 day and 28 day strengths. Each mixture shall be designed to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

1.7.2 Average Compressive Strength Required for Mixtures

The mixture proportions selected during mixture design studies shall produce a required average compressive strength (f'cr) exceeding the specified compressive strength (f'c) by the amount indicated below. This required average compressive strength, f'cr, will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below f'cr during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day f'cr, the mixture shall be adjusted, as approved, to bring the daily average back up to f'cr. During production, the required f'cr shall be adjusted, as appropriate, based on the standard deviation being attained on the job.

1.7.2.1 Computations from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214.3R. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected; shall represent concrete produced to meet a specified strength or strengths (f'c) within 1,000 psi of that specified for proposed work; and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

f'cr = f'c + where units are in psi

f'cr = f'c + 2.33S - 500 where units are in psi

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

1.7.2.2 Computations without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f'cr shall be determined as follows:

$$f'cr = f'c + 1,200 \text{ psi}$$

1.8 STORAGE OF MATERIALS

Cement and other cementitious materials shall be stored in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Reinforcing bars and accessories shall be stored above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

1.9 GOVERNMENT ASSURANCE INSPECTION AND TESTING

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any of his CQC responsibilities.

1.9.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.9.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

1.9.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.9.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious Materials shall be Type II portland cement in combination with pozzolan or ground granulated blast furnace slag and shall conform to the appropriate specifications listed below. Use of cementitious materials in concrete which will have surfaces exposed in the completed structure shall be restricted so there is no change in color, source, or type of cementitious material.

2.1.1 Portland Cement

Portland cement shall meet the requirements of ASTM C 150 Type II low alkali. The alkali content shall not exceed 0.6 percent. Pozzolan or ground granulated blast furnace slag is required in the concrete mixture. Alternatively, if the Contractor can show evidence that the expansion of the combination of type II portland cement (that does not meet the low-alkali requirement) with pozzolan or ground granulated blast furnace slag is equal to or less than the expansion of a low alkali cement meeting the requirements of this paragraph when tested in general conformance with ASTM C 441, this is an acceptable substitute for low alkali cement. The expansion tests shall be run concurrently at an independent laboratory that is nationally recognized to perform such tests. The government reserves the right to confirm the test results and to adjust the percentage of pozzolan or GGBF slag in the combination to suit other requirements.

2.1.2 High-Early-Strength Portland Cement

ASTM C 150, Type III with tricalcium aluminate limited to 8 percent, low alkali. Type III cement shall be used only in isolated instances and only when approved in writing.

2.1.3 Pozzolan (Fly Ash)

ASTM C 618, Class F with the optional requirements for multiple factor, drying shrinkage, and uniformity from Table 2A of ASTM C 618. Requirement for maximum alkalies from Table 1A of ASTM C 618 shall apply. If pozzolan is used in lieu of GGBF, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

2.1.4 Ground Granulated Blast-Furnace (GGBF) Slag

ASTM C 989, Grade 120. If GGBF is used in lieu of Class F fly ash, it shall never be approximately 50 percent of the weight of the total cementitious material, unless otherwise indicated by the GGBF manufacturer

and approved by the Contacting Officer.

2.2 AGGREGATES

Aggregates shall conform to the following.

2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33.

2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33, Class 5S, size designation Number 57 for all concrete.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494, Type A, B, or D, except that the 6-month and 1-year compressive strength tests are waived.

2.3.4 High-Range Water Reducer

ASTM C 494, Type F or G, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.3.5 Surface Retarder

COE CRD-C 94.

2.3.6 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture

control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional, except, that polyethylene sheet shall not be used.

2.4.2 Membrane-Forming Compound

Membrane-Forming curing compound shall conform to ASTM C 309, Type 1-D or 2, except that only a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing, or flooring specified. Nonpigmented compound shall contain a fugitive dye, and shall have the reflective requirements in ASTM C 309 waived.

2.4.3 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107, Grade A, B or C and shall be a commercial formulation suitable for the proposed application.

2.7 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

2.8 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

2.9 EMBEDDED ITEMS

Embedded items shall be of the size and type indicated or as needed for the application. Dovetail slots shall be galvanized steel. Inserts for shelf angles and bolt hangers shall be of malleable iron or cast or wrought steel.

2.10 JOINT MATERIALS

2.10.1 Joint Fillers and Sealers

Expansion joint fillers shall be preformed materials conforming to ASTM D 1751 or ASTM D 1752. Materials for and sealing of joints shall also conform to the requirements of Section 03150.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, the following shall be performed. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03101 FORMWORK FOR CONCRETE. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03210 STEELBARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Concrete on Earth Foundations

Earth (structural backfill, subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the earth shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.1.2 Excavated Surfaces in Lieu of Forms

Concrete for footings and walls may be placed directly against the soil provided the earth has been carefully trimmed, is uniform and stable, and meets the compaction requirements of Section 02720 STORM DRAINAGE SYSTEM. The concrete shall be placed without becoming contaminated by loose material, and the outline of the concrete shall be within the specified tolerances.

3.1.2 Previously Placed Concrete (Construction Joint Treatment)

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift or adjacent concrete by cleaning the construction joint surface with either air-water cutting, sandblasting, or high-pressure water jet. If, for any reason, it is

considered undesirable to disturb the surface of a lift before it has hardened, the use of sandblasting or high-pressure water jet after hardening will be required. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. Where joint preparation occurs more than 2 days prior to placing the next lift or where the work in the area subsequent to the joint preparation causes dirt or debris to be deposited on the surface, the surface shall be cleaned as the last operation prior to placing the next lift. The surface of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete, except that the surface shall be damp with no free water at the time of placement. When bonding to existing concrete, a grout of cement and water shall be scrubbed with a brush into the surfaces to which the new material is to be bonded (after cleaning as discussed above). The area shall be damp but without free water when the grout is applied.

3.1.2.1 Air-Water Cutting

Air-water cutting of a construction joint shall be performed at the proper time, generally between 4 and 12 hours after placement and only on horizontal construction joints. This period may be modified if a retarder is used to prolong the setting of the cement at surface of the concrete. The air pressure used in the jet shall be 90 to 110 psi, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved a surface retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift to prolong the period of time during which air-water cutting is effective. Prior to receiving approval, the Contractor shall furnish samples of the material to be used and shall demonstrate the method to be used in its application. After cutting, the surface shall be washed and rinsed until the wash water is no longer cloudy. If air-water cutting does not produce acceptable results, the surface shall be prepared by high-pressure water jet or sandblasting.

3.1.2.2 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 psi shall be used for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the waterjet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.1.2.3 Wet Sandblasting

This method of joint preparation may be used when the concrete has reached sufficient strength to prevent undercutting of coarse aggregate particles. The operation shall be continued until all accumulated laitance, coatings, stains, debris, and foreign materials are removed. The surface of the

concrete shall then be washed thoroughly to remove all loose material. This method may be used on both horizontal and vertical surfaces.

3.1.2.4 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.1.3 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 1 foot of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

3.2 CONCRETE PRODUCTION

3.2.1 Batching, Mixing, and Transporting Concrete

Concrete shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB-01 or shall comply with PENDOT requirements if approved by the Contracting Officer. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3 or shall be PENDOT certified. Approved batch tickets shall be furnished for each load of ready-mixed concrete.

3.3 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers. Methods and equipment for conveying and depositing the concrete into the form shall be subject to approval. The capacity of the transporting system shall be sufficient to supply concrete at a rate to prevent cold joints forming during placement. A properly designed and sized elephant trunk and rigid drop chute bottom section which will prevent free-fall within the elephant trunk and rigid drop chute will be used if concrete is to drop more than 5 feet. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the concrete shall discharge into a pipe or elephant trunk that is long enough to extend through the reinforcing bars to within 5 feet of the placing surface. In no case will concrete be discharged to free fall through the reinforcing bars.

3.4 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from truck mixer (transporting unit) to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.4.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet.The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yardsshall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.4.2 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94. Nonagitating equipment shall be used only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.4.3 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.4.4 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.5 PLACING CONCRETE

Mixed concrete shall be discharged within 1-1/2 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the

concrete temperature exceeds 80 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. The capacity of the placing system shall be sufficient to supply concrete at a rate which will prevent cold joints in any placement. Concrete shall be worked into the corners and angles of the forms and around all reinforcement and embedded items without permitting the material to segregate. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, temperature, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing, protection, and curing.

3.5.1 Depositing Concrete

Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Concrete for beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as concrete for adjoining slabs.

3.5.2 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not

be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.5.3 Cold Weather Requirements

Special protection measures, approved by the Contracting Officer, shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 55 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not be used.

3.5.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.5.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic

shrinkage cracks to develop and shall institute measures to prevent this. Particular care shall be taken if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.5.6 Placing Concrete in Congested Areas

Special care shall be used to ensure complete filling of the forms, elimination of all voids, and complete consolidation of the concrete when placing concrete in areas congested with reinforcing bars, embedded items, and other tight spacing. An appropriate concrete mixture shall be used, and the nominal maximum size of aggregate (NMSA) shall meet the specified criteria when evaluated for the congested area. Vibrators with heads of a size appropriate for the clearances available shall be used, and the consolidation operation shall be closely supervised to ensure complete and thorough consolidation at all points. Where necessary, splices of reinforcing bars shall be alternated to reduce congestion. Where two mats of closely spaced reinforcing are required, the bars in each mat shall be placed in matching alignment to reduce congestion. Reinforcing bars may be temporarily crowded to one side during concrete placement provided they are returned to exact required location before concrete placement and consolidation are completed.

3.5.7 Placing Flowable Concrete

If a plasticizing admixture conforming to ASTM C 1017 is used or if a Type F or G high range water reducing admixture is permitted to increase the slump, the concrete shall meet all requirements of paragraph GENERAL REQUIREMENTS in PART 1. Extreme care shall be used in conveying and placing the concrete to avoid segregation. Consolidation and finishing shall meet all requirements of paragraphs Placing Concrete, Finishing Formed Surfaces, and Finishing Unformed Surfaces. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.6 JOINTS

Joints shall be located and constructed as indicated on the drawings or as otherwise approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. Joints in walls shall be at the tops of footings, unless otherwise approved. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints. Reinforcement shall be 2 inches clear from each joint. Reservoir for sealant for construction and contraction joints shall be formed to the dimensions shown on the drawings by sawing to widen the top portion of sawed joints. Joints to be sealed shall be cleaned and sealed as indicated and in accordance with Section 03150.

3.6.1 Construction Joints

Construction Joints shall be located as indicated on the drawings. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Construction joints shall be located as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer. Unless otherwise indicated, reinforcing steel shall extend through construction joints. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints in walls are required, a strip of 1 inch square-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete.

3.6.2 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03150 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE.

3.6.3 Dowels

Dowels shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03210 STEELBARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in concrete using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. Care shall be taken during placing adjacent to and around dowels to ensure there is no displacement of the dowel and that the concrete completely embeds the dowel and is thoroughly consolidated.

3.7 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03101 FORMWORK FOR CONCRETE. Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class B finish. Except for major defects, as defined hereinafter, surface defects shall be repaired as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any

location. Tolerances of formed surfaces shall conform to the requirements of ACI 117/117R. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.7.1 Class B Finish

Class B finish is required for all concrete exposed to view unless otherwise indicated on the drawings. Fins, ravelings, and loose material shall be removed, all surface defects over 1/2 inch in diameter or more than 1/2 inch deep, shall be repaired and, except as otherwise indicated or as specified in Section 03101 FORMWOEK FOR CONCRETE, holes left by removal of form ties shall be reamed and filled. Defects more than 1/2 inch in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep.

3.7.2 Class D Finish

Class D finish is required for concrete not exposed to view unless otherwise indicated on the drawings. Fins, ravelings, and loose material shall be removed, and, except as otherwise indicated or as specified in Section 03101 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Honeycomb and other defects more than 1/2 inch deep or more than 2 inches in diameter shall be repaired. Defects more than 2 inches in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep.

3.8 REPAIRS

3.8.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter but not over 4 inches shall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the No. 16 mesh sieve, and minimum amount of water. Only sufficient water shall be used to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will

leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer and hardwood block. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through to the outside face. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

3.8.2 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep or, for Class B finishes, more than 1/2 inch in diameter. Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Major defects shall be repaired as specified below.

3.8.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Approved equipment and procedures which will not cause cracking or microcracking of the sound concrete shall be used. If reinforcement is encountered, concrete shall be removed so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inches shall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Surfaces shall be kept continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, at his option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, the Contractor shall test each repair area for drumminess by firm tapping with a hammer and shall inspect for cracks, both in the presence of the Contracting Officer's representative, immediately before completion of the contract, and shall replace any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Burlap shall be kept

continually wet.

3.8.2.2 Repair of Deep and Large Defects

Deep and large defects will be those that are more than 6 inches deep and also have an average diameter at the surface more than 18 inches or that are otherwise so identified by the Project Office. Such defects shall be repaired as specified herein or directed, except that defects which affect the strength of the structure shall not be repaired and that portion of the structure shall be completely removed and replaced. Deep and large defects shall be repaired by procedures approved in advance including forming and placing special concrete using applied pressure during hardening. Preparation of the repair area shall be as specified for surface application of mortar. In addition, the top edge (surface) of the repair area shall be sloped at approximately 20 degrees from the horizontal, upward toward the side from which concrete will be placed. The special concrete shall be a concrete mixture with low water content and low slump, and shall be allowed to age 30 to 60 minutes before use. Concrete containing a specified expanding admixture may be used in lieu of the above mixture; the paste portion of such concrete mixture shall be designed to have an expansion between 2.0 and 4.0 percent when tested in accordance with ASTM C 940. A full width "chimney" shall be provided at the top of the form on the placing side to ensure filling to the top of the opening. A pressure cap shall be used on the concrete in the chimney with simultaneous tightening and revibrating the form during hardening to ensure a tight fit for the repair. The form shall be removed after 24 hours and immediately the chimney shall be carefully chipped away to avoid breaking concrete out of the repair; the surface of the repair concrete shall be dressed as required.

3.8.3 Resinous and Latex Material Repair

In lieu of the portland cement bonding coats specified above, an approved epoxy resin or a latex bonding agent may be used.

3.9 FINISHING UNFORMED SURFACES

The finish of all unformed surfaces shall meet the requirements of paragraph Tolerances in PART 1, when tested as specified herein.

3.9.1 General

The ambient temperature of spaces adjacent to unformed surfaces being finished and of the base on which concrete will be placed shall be not less than 50 degrees F. In hot weather all requirements of paragraphs Hot Weather Requirements and Prevention of Plastic Shrinkage Cracking shall be met. Unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, with additional finishing as specified below, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings, properly consolidated, and left true and regular. Unless otherwise shown on the drawings, exterior surfaces shall be sloped for drainage, as directed. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from

stains or abrasions. Grate tampers or "jitterbugs" shall not be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing shall not be permitted. If bleed water is present prior to finishing, the excess water shall be carefully dragged off or removed by absorption with porous materials such as burlap. During finishing operations, extreme care shall be taken to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Any concrete with surfaces which exhibit significant crazing shall be removed and replaced.

3.9.2 Rough Slab Finish

Inlet/Outlet structures, manhole base slabs and tops of walls shall be given a Rough Slab Finish. The concrete shall be uniformly placed across the slab area, consolidated as previously specified, and then screeded with straightedge strikeoffs immediately after consolidation to bring the surface to the required finish level with no coarse aggregate visible. Side forms and screed rails shall be provided, rigidly supported, and set to exact line and grade. Allowable tolerances for finished surfaces apply only to the hardened concrete, not to forms or screed rails. Forms and screed rails shall be set true to line and grade. "Wet screeds" shall not be used.

3.9.3 Floated Finish

Slabs to receive more than a rough slab finish shall next be given a wood float finish. The screeding shall be followed immediately by darbying or bull floating before bleeding water is present, to bring the surface to a true, even plane. Then, after the concrete has stiffened so that it will withstand a man's weight without imprint of more than 1/4 inch and the water sheen has disappeared, it shall be floated to a true and even plane free of ridges. Floating shall be performed by use of suitable hand floats or power driven equipment. Sufficient pressure shall be used on the floats to bring a film of moisture to the surface. Hand floats shall be made of wood, magnesium, or aluminum. Concrete that exhibits stickiness shall be floated with a magnesium float. Care shall be taken to prevent over-finishing or incorporating water into the surface.

3.9.4 Non-Slip Finish

All horizontal concrete surfaces exposed to vehicular or pedestrian traffic (including but not limited to concrete around manholes) shall be given a broomed finish as specified below.

3.9.4.1 Broomed Finish

After floating, the surface shall be lightly steel troweled, and then carefully scored by pulling a coarse fiber push-type broom across the surface. Brooming shall be transverse to traffic or at right angles to the slope of the concrete. After the end of the curing period, the surface shall be vigorously broomed with a coarse fiber broom to remove all loose or semi-detached particles.

3.10 CURING AND PROTECTION

3.10.1 General

Concrete shall be cured by one of the following methods or combination of methods for the period of time given below corresponding to the cementing materials used in the concrete:

Concrete with Type III cement	3 days
Type II portland cement blended with 25 percent or less fly-ash or GGBF slag (if approved)	14 days
Type II portland cement blended with more than 25 percent fly-ash or GGBF slag	21 days

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Air and forms in contact with concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.10.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. The Contractor shall have an approved work system to ensure that moist curing is continuous 24 hours per day.

3.10.3 Membrane Forming Curing Compounds

Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete, including surfaces to which a smooth finish is to be applied or other concrete to be bonded. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 psi, at a uniform coverage of not more than 400 square feet per gallon for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Surfaces on which clear compound is used shall be shaded from direct rays of the sun for the first 3 days. Surfaces coated with curing compound shall be kept free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

3.10.4 Impervious Sheeting

Except for plastic coated burlap, impervious sheeting alone shall not be used for curing. Impervious-sheet curing shall only be used on horizontal or nearly horizontal surfaces. Surfaces shall be thoroughly wetted and be completely covered with the sheeting. Sheeting shall be at least 18 inches wider than the concrete surface to be covered. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

3.10.5 Ponding or Immersion

Concrete shall be continually immersed throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete.

3.10.6 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 32 degrees F the temperature of the concrete shall be maintained above 40 degrees F throughout the entire curing period (reference paragraph CURING AND PROTECTION for specified curing time). During the period of protection

removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential as indicated in table 5.5 of ACI 306R as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor as directed. The selection of insulation shall be based upon the requirements specified illustrated in chapter 7 of ACI 306R. The insulation shall be maintained in such a condition that the R value does not diminish during the period of protection. Edges and corners of the placement shall be protected with a double layer of the insulation specified above for a minimum distance of 2 feet in all directions. Forms shall be insulated in such a manner that the combined form-insulation system shall have a thermal resistance (R value) not less than that specified. Insulation and the combined form-insulation system shall remain in place for at least 5 days after placement of the concrete. After 5 days (provided the required strength of concrete is obtained to support structure), forms and insulation on vertical surfaces may be removed for periods not to exceed 4 hours in a 24 hour period to allow forms to be moved, and insulation on horizontal surfaces may be removed for periods not to exceed 8 hours in a 24 hour period to allow reinforcement to be installed, insulation to be installed, lift joints to be prepared, etc. provided that suitable precautions are taken to prevent the concrete from being subjected at any time to ambient temperatures of 20 degrees F or below. The first 6 feet of all steel protruding from insulated concrete shall be insulated with material having an R value as stated. All form bolts and metal ribs on the forms shall be insulated in a like manner. During the period of protection there shall be no holes or openings in the insulation or between the insulation and concrete which permit ambient air to penetrate the insulation except as noted for construction purposes. Special attention shall be given to seams, corners, and edges to prevent holes or openings in the insulation.

3.11 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL

The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and shall submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall cease and the operation shall be corrected. The laboratory performing the tests shall be on site and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and periodically thereafter for conformance with ASTM C 1077.

3.11.1 Grading and Corrective Action

3.11.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for

each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.11.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and shall be reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.11.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, the Contractor shall perform all tests for aggregate quality required by ASTM C 33. Tests shall not have been performed more than 6 months prior to submission. The mortar bar method of testing for alkali reaction shall be performed only if the chemical test method indicates the aggregates to be potentially deleterious. In addition, after the start of concrete placement, the Contractor shall perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.11.3 Scales, Batching and Recording

The accuracy of the scales shall be checked by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, the Contractor shall test and ensure that the devices for dispensing admixtures are

operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.11.4 Batch-Plant Control

The measurement of concrete materials including cementitious materials, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

3.11.5 Concrete Mixture

a. Air Content Testing. One test for air content shall be performed per truckload of concrete. Tests shall be made in accordance with ASTM C 231 for normal weight concrete. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment. An upper warning limit and a lower warning limit line shall be set 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.

b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

c. Slump Testing. One slump test shall be performed per truckload of concrete. Tests shall be performed in accordance with ASTM C 143. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Limits shall be set on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Samples for slump shall be taken at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.

d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, an adjustment shall immediately be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no

adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, the concreting operation shall immediately be halted, and the Contractor shall take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.

e. Temperature. The temperature of the concrete shall be measured when compressive strength specimens are fabricated except that one temperature measurement shall be performed per truckload of concrete when the ambient temperature reaches values requiring special temperature control measures as indicated paragraph "Concrete Temperature And Temperature Control Measures". Measurement shall be in accordance with ASTM C 1064. The temperature shall be reported along with the compressive strength data.

f. Strength Specimens. At least one set of test specimens shall be made for compressive on each different concrete mixture placed during the day for each 50 cubic yards or portion thereof of that concrete mixture placed each day. Additional sets of test specimens shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. A truly random (not haphazard) sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength per paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. Test specimens shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39 for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214.3R.

3.11.6 Inspection Before Placing

Foundations, construction joints, forms, and embedded items shall be inspected by the Contractor in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

3.11.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient

temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.11.8 Vibrators

The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing. Any vibrator not meeting the requirements of paragraph Consolidation, shall be immediately removed from service and repaired or replaced.

3.11.9 Curing Inspection

a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.

c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, the Contractor shall estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, shall compute the rate of coverage in square feet per gallon, and shall note whether or not coverage is uniform.

d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted

and recorded.

f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

3.11.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.11.11 Mixer Uniformity

a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94.

b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.11.12 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

-- End of Section --

SECTION 05055

METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS

PART 1 GENERAL

1.1 REFERENCES

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

ALUMINUM ASSOCIATION (AA)

AA SAS-30	(1986) Aluminum Structures Construction Manual Series - Section 1 Specifications for Aluminum Structures

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)

AGMA 2005-B	(1988) Design Manual for Bevel Gears
AGMA 6001-C	(1988) Design and Selection of Components for Enclosed Gear Drives

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 325	(1994) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(1993) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 380	(1994a) Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems
ASTM A 490	(1993) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 490M	(1993) High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 514/A 514M	(1994a) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM B 177	(1993) Chromium Electroplating on Steel

	for Engineering Use
ASTM B 766	(1986; R 1993) Electrodeposited Coatings of Cadmium
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM D 962	(1981; R 1994) Aluminum Powder and Paste Pigments for Paints
ASTM E 94	(1993) Radiographic Testing
ASTM E 165	(1995) Liquid Penetrant Examination Inspection Method
ASTM E 446	(1993) Radiographs for Steel Casting up to 2 in. (51 mm) in Thickness
ASTM E 709	(1995) Magnetic Particle Examination

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B4.1	(1967; R 1994) Preferred Limits and Fits for Cylindrical Parts
ASME B46.1	(1985) Surface Texture (Surface Roughness, Waviness, and Lay)
ASME BPV IX	(1995) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(1994) Structural Welding Code - Steel
AWS D1.2	(1990) Structural Welding Code - Aluminum

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS 3110	(1992; Rev G) Primer Zinc Chromate
SAE AMS 3132	(1994; Rev F) Varnish, Phenolic Resin Corrosion-Preventive

1.2 SUBMITTALS

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

SD-04 Drawings

Detail Drawings; GA.

Detail drawings for metalwork and machine work shall be submitted and approved prior to fabrication.

SD-07 Schedules

Materials Orders; FIO.

Copies of purchase orders, mill orders, shop orders and work orders for materials shall be submitted prior to the use of the materials in the work.

Materials List; FIO.

Materials list for fabricated items shall be submitted at the time of submittal of detail drawings.

Shipping Bill; FIO.

Shipping bill shall be submitted with the delivery of finished pieces to the site.

SD-08 Statements

Welding Procedures for Structural Steel; GA.

Schedules of welding procedures for steel structures shall be submitted and approved prior to commencing fabrication.

Welding of Aluminum; GA.

Schedules of welding processes for aluminum fabrications shall be submitted and approved prior to commencing fabrication.

Structural Steel Welding Repairs; GA.

Welding repair plans for steel shall be submitted and approved prior to making repairs.

SD-09 Reports

Tests, Inspections, and Verifications; FIO.

Certified test reports for materials shall be submitted with all materials delivered to the site.

SD-13 Certificates

Qualification of Welders and Welding Operators; FIO.

Certifications for welders and welding operators shall be submitted prior to commencing fabrication.

Welding of Aluminum; GA.

Certified report for aluminum welding qualification tests shall be submitted and approved prior to commencing welding.

SD-18 Records

Materials Disposition Records; FIO.

Materials disposition records shall be submitted before completion of contract.

1.3 METALWORK AND MACHINE WORK DETAIL DRAWINGS

Detail drawings for metalwork and machine work shall include catalog cuts, templates, fabrication and assembly details and type, grade and class of material as appropriate. Elements of fabricated items inadvertently omitted on contract drawings shall be detailed by the fabricator and indicated on the detail drawings.

1.4 QUALIFICATION OF WELDERS AND WELDING OPERATORS

The Contractor shall certify that the qualification of welders and welding operators and tack welders who will perform structural steel welding have been qualified for the particular type of work to be done in accordance with the requirements of AWS D1.1, Section 5,, prior to commencing fabrication. The certificate shall list the qualified welders by name and shall specify the code and procedures under which qualified and the date of qualification. Prior qualification will be accepted if welders have performed satisfactory work under the code for which qualified within the preceding three months. The Contractor shall require welders to repeat the qualifying tests when their work indicates a reasonable doubt as to proficiency. Those passing the requalification tests will be recertified. Those not passing will be disqualified until passing. All expenses in connection with qualification and requalification shall be borne by the Contractor.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Materials Orders

The Contractor shall furnish 2 copies of purchase orders, mill orders, shop orders and work orders for all materials orders and items used in the work. Where mill tests are required purchase orders shall contain the test site address and the name of the testing agency.

2.1.2 Materials List

The Contractor shall furnish a materials list of the materials to be used in the fabrication of each item.

2.1.3 Shipping Bill

The Contractor shall furnish a shipping bill or memorandum of each shipment of finished pieces or members to the project site giving the designation mark and weight of each item, the number of items, the total weight, and the car initial and number if shipped by rail in carload lots.

2.2 FABRICATION

2.2.1 Structural Fabrication

Material must be straight before being laid off or worked. If straightening is necessary it shall be done by methods that will not impair the metal. Sharp kinks or bends shall be cause for rejection of the material. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Bends shall be made by approved dies, press brakes or bending rolls. Where heating is required, precautions shall be taken to avoid overheating the metal and it shall be allowed to cool in a manner that will not impair the original properties of the metal. Proposed flame cutting of material other than structural steel shall be subject to approval and shall be indicated on detail drawings. Shearing shall be accurate and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown. Re-entrant cuts shall be filleted to a minimum radius of 3/4 inch unless otherwise approved. Finished members shall be free of twists, bends and open joints. Bolts, nuts and screws shall be tight.

2.2.1.1 Dimensional Tolerances for Structural Work

Dimensions shall be measured by an approved calibrated steel tape of approximately the same temperature as the material being measured. The overall dimensions of an assembled structural unit shall be within the tolerances indicated on the drawings or as specified in the particular section of these specifications for the item of work. Where tolerances are not specified in other sections of these specifications or shown, an allowable variation of 1/32 inch is permissible in the overall length of component members with both ends milled and component members without milled ends shall not deviate from the dimensions shown by not more than 1/16 inch for members 30 feet or less in length and by more than 1/8 inch for members over 30 feet in length.

2.2.1.2 Structural Steel Fabrication

Structural steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a surface that is smooth and free from cracks and notches is obtained. Surfaces and edges to be welded shall be prepared in accordance with AWS D1.1, Subsection 3.2. Where structural steel is not to be welded, chipping or grinding will not be required except as necessary to remove slag and sharp edges of mechanically guided or hand-guided cuts not exposed to view. Hand-guided cuts which are to be exposed or visible shall be chipped, ground or machined to sound metal.

2.2.2 Welding

2.2.2.1 Welding of Structural Steel

a. Welding Procedures for Structural Steel - Welding procedures for structural steel shall be prequalified as described in AWS D1.1, Subsection 5.1 or shall be qualified by tests as prescribed in AWS D1.1, Section 5. Properly documented evidence of compliance with all requirements of these specifications for previous qualification tests shall establish a welding procedure as prequalified. For welding procedures qualified by tests, the test welding and specimen testing must be witnessed and the test report document signed by the Contracting Officer. Approval of any welding procedure will not relieve the Contractor of the responsibility for producing a finished structure meeting all requirements of these specifications. The Contractor will be directed or authorized to make any changes in previously approved welding procedures that are deemed necessary or desirable by the Contractor Officer. The Contractor shall submit a complete schedule of welding procedures for each steel structure to be welded. The schedule shall conform to the requirements specified in the provisions AWS D1.1, Sections 2, 3, 4, 7 and 9 and applicable provisions of Section 10. The schedule shall provide detailed procedure specifications and tables or diagrams showing the procedures to be used for each required joint. Welding procedures must include filler metal, preheat, interpass temperature and stress-relief heat treatment requirements. Each welding procedure shall be clearly identified as being prequalified or required to be qualified by tests. Welding procedures must show types and locations of welds designated or in the specifications to receive nondestructive examination.

b. Welding Process - Welding of structural steel shall be by an electric arc welding process using a method which excludes the atmosphere from the molten metal and shall conform to the applicable provisions of AWS D1.1, Sections 1 thru 7, 9, 10 and 11. Welding shall be such as to minimize residual stresses, distortion and shrinkage.

c. Welding Technique

(1) Filler Metal - The electrode, electrode-flux combination and grade of weld metal shall conform to the appropriate AWS specification for the base metal and welding process being used or shall be as shown where a specific choice of AWS specification allowables is required. The AWS designation of the electrodes to be used shall be included in the schedule of welding procedures. Only low hydrogen electrodes shall be used for manual shielded metal-arc welding regardless of the thickness of the steel. A controlled temperature storage oven shall be used at the job site as prescribed by AWS D1.1, Subsection 4.5 to maintain low moisture of low hydrogen electrodes.

(2) Preheat and Interpass Temperature - Preheating shall be performed as required by AWS D1.1, Subsection 4.2 and 4.3 or as otherwise specified except that the temperature of the base metal shall be at least 70 degrees F. The weldments to be preheated shall be slowly and uniformly heated by approved means to the prescribed temperature, held at that temperature until the welding is completed and then permitted to cool slowly in still air.

(3) Stress-Relief Heat Treatment - Where stress relief heat treatment is specified or shown, it shall be in accordance with the requirements of AWS D1.1, Subsection 4.4 unless otherwise authorized or directed.

d. Workmanship - Workmanship for welding shall be in accordance with AWS D1.1, Section 3 and other applicable requirements of these specifications.

(1) Preparation of Base Metal - Prior to welding the Contractor shall inspect surfaces to be welded to assure compliance with AWS D1.1, Subsection 3.2.

(2) Temporary Welds - Temporary welds required for fabrication and erection shall be made under the controlled conditions prescribed for permanent work. Temporary welds shall be made using low-hydrogen welding electrodes and by welders qualified for permanent work as specified in these specifications. Preheating for temporary welds shall be as required by AWS D1.1 for permanent welds except that the minimum temperature shall be 120 degrees F in any case. In making temporary welds arcs shall not be struck in other than weld locations. Each temporary weld shall be removed and ground flush with adjacent surfaces after serving its purpose.

(3) Tack Welds - Tacks welds that are to be incorporated into the permanent work shall be subject to the same quality requirements as the permanent welds and shall be cleaned and thoroughly fused with permanent welds. Preheating shall be performed as specified above for temporary welds. Multiple-pass tack welds shall have cascaded ends. Defective tack welds shall be removed before permanent welding.

2.2.3 Bolted Connections

2.2.3.1 Bolted Structural Steel Connections

Bolts, nuts and washers shall be of the type specified or indicated. All nuts shall be equipped with washers except for high strength bolts. Beveled washers shall be used where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified or indicated the materials, workmanship and installation shall conform to the applicable provisions of ASTM A 325 or ASTM A 490.

a. Bolt Holes - Bolt holes shall be accurately located, smooth, perpendicular to the member and cylindrical.

(1) Holes for regular bolts shall be drilled or subdrilled and reamed in the shop and shall not be more than 1/16 inch larger than the diameter of the bolt.

(2) Holes for fitted bolts shall be match-reamed or drilled in

the shop. Burrs resulting from reaming shall be removed. The threads of bolts shall be entirely outside of the holes. The body diameter of bolts shall have tolerances as recommended by ASME B4.1 for the class of fit specified. Fitted bolts shall be fitted in reamed holes by selective assembly to provide an LN-2 fit.

(3) Holes for high strength bolts shall have diameters of not more than 1/16 inch larger than bolt diameters. If the thickness of the material is not greater than the diameter of the bolts the holes may be punched. If the thickness of the material is greater than the diameter of the bolts the holes may be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the bolts and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting occurring during assembly shall not distort the metal or enlarge the holes. Reaming to a larger diameter of the next standard size bolt will be allowed for slight mismatching.

2.2.3.2 Bolted Aluminum Connections

Punching, drilling, reaming and bolting for bolted aluminum connections shall conform to the requirements of AA SAS-30, Section 6.

2.2.4 Machine Work

Tolerances, allowances and gauges for metal fits between plain, non-threaded, cylindrical parts shall conform to ASME B4.1 for the class of fit shown or required unless otherwise shown on approved detail drawings. Where fits are not shown they shall be suitable as approved. Tolerances for machine-finished surfaces designated by non-decimal dimensions shall be within 1/64 inch. Sufficient machining stock shall be allowed on placing pads to ensure true surfaces of solid material. Finished contact or bearing surfaces shall be true and exact to secure full contact. Journal surfaces shall be polished and all surfaces shall be finished with sufficient smoothness and accuracy to ensure proper operation when assembled. Parts entering any machine shall be accurately machined and all like parts shall be interchangeable except that parts assembled together for drilling or reaming of holes or machining will not be required to be interchangeable with like parts. All drilled holes bolts shall be accurately located.

2.2.4.1 Finished Surfaces

Surface finishes indicated or specified shall be in accordance with ASME B46.1. Values of required roughness heights are arithmetical average deviations expressed in microinches. These values are maximum. Lesser degrees will be satisfactory unless otherwise indicated. Compliance with surface requirements shall be determined by sense of feel and visual inspection of the work compared to Roughness Comparison Specimens in accordance with the provisions of ASME B46.1. Values of roughness width and waviness height shall be consistent with the general type of finish specified by roughness height. Where the finish is not indicated or specified it shall be that which is most suitable for the particular surface, provide the class of fit required and be indicated on the detail

drawings by a symbol which conforms to ASME B46.1 when machine finishing is provided. Flaws such as scratches, ridges, holes, peaks, cracks or checks which will make the part unsuitable for the intended use will be cause for rejection.

2.2.4.2 Unfinished Surfaces

All work shall be laid out to secure proper matching of adjoining unfinished surfaces unless otherwise directed. Where there is a large discrepancy between adjoining unfinished surfaces they shall be chipped and ground smooth or machined to secure proper alignment. Unfinished surfaces shall be true to the lines and dimensions shown and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the parts shall be filled in an approved manner.

2.2.4.3 Pin Holes

Pin holes shall be bored true to gauges, smooth, straight and at right angles to the axis of the member. The boring shall be done after the member is securely fastened in position.

2.2.4.4 Bearings

Bearings may be lined with babbit or bronze unless otherwise specified or shown. Where the bearing pressure is in excess of200 psi, bearings shall be lined with bronze. Pressures on lined bearings shall not exceed 200 psi of projected area unless otherwise required or authorized. Anti-friction bearings of approved types and of sizes not less than those recommended by the bearing manufacturer for the duty intended will be permitted subject to approval. All bearings shall be properly aligned and provided with a suitable means of lubrication. Anti-friction bearings shall be so installed as to provide for retention of the lubricant and to exclude dirt and grit.

2.2.5 Miscellaneous Provisions

2.2.5.1 Metallic Coatings

a. Zinc Coatings - Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123. Where zinc coatings are destroyed by cutting, welding or other causes the affected areas shall be regalvanized. Coatings 2 ounces or heavier shall be regalvanized with a suitable low-melting zinc base alloy similar to the recommendations of the American Hot-Dip Galvanizers Association to the thickness and quality specified for the original zinc coating. Coatings less than 2 ounces shall be repaired in accordance with ASTM A 780.

2.2.5.2 Cleaning of Corrosion-Resisting Steel

Oil, paint and other foreign substances shall be removed from corrosion-resisting steel surfaces after fabrication. Cleaning shall be done by vapor degreasing or by the use of cleaners of the alkaline,

emulsion or solvent type. After the surfaces have been cleaned they shall be given a final rinsing with clean water followed by a 24 hour period during which the surfaces are intermittently wet with clean water and then allowed to dry for the purpose of inspecting the clean surfaces. The surfaces shall be visually inspected for evidence of paint, oil, grease, welding slag, heat treatment scale, iron rust or other forms of contamination. If evidence of foreign substance exist the surface shall be cleaned in accordance with the applicable provisions of ASTM A 380. The proposed method of treatment shall be furnished for approval. After treatment the surfaces shall be visually reinspected. Brushes used to remove foreign substances shall have only stainless steel or nonmetallic bristles. Any contamination occurring subsequent to the initial cleaning shall be removed by one or more of the methods indicated above.

2.2.5.3 Lubrication

The arrangement and details for lubrication shall be as shown. Before erection or assembly all bearing surfaces shall be thoroughly cleaned and lubricated with an approved lubricant.

2.2.6 Shop Assembly

Each machinery and structural unit furnished shall be assembled in the shop to determine the correctness of the fabrication and matching of the component parts unless otherwise specified. Tolerances shall not exceed those shown. Each unit assembled shall be closely checked to ensure that all necessary clearances have been provided and that binding does not occur in any moving part. Assembly in the shop shall be in the same position as final installation in the field unless otherwise specified. Assembly and disassembly work shall be performed in the presence of the Contracting Officer unless waived in writing. Errors or defects disclosed shall be immediately remedied by the Contractor without cost to the Government. Before disassembly for shipment each piece of a machinery or structural unit shall be match-marked to facilitate erection in the field. The location of match-marks shall be indicated by circling with a ring of white paint after the shop coat of paint has been applied or as otherwise directed.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

The Contractor shall have required material tests and analyses performed and certified by an approved laboratory to demonstrate that materials are in conformity with the specifications. These tests and analyses shall be performed and certified at the Contractor's expense. Tests, inspections, and verifications shall conform to the requirements of the particular sections of these specifications for the respective items of work unless otherwise specified or authorized. Tests shall be conducted in the presence of the Contracting Officer if so required. The Contractor shall furnish specimens and samples for additional independent tests and analyses upon request by the Contracting Officer. Specimens and samples shall be properly labeled and prepared for shipment.

2.3.1 Nondestructive Testing

When doubt exists as to the soundness of any material part such part may be subjected to any form of nondestructive testing determined by the Contracting Officer. This may include ultrasonic, magnaflux, dye penetrant, x-ray, gamma ray or any other test that will thoroughly investigate the part in question. The cost of such investigation will be borne by the Government. Any defects will be cause for rejection and rejected parts shall be replaced and retested at the Contractor's expense.

2.3.2 Tests of Machinery and Structural Units

The details for tests of machinery and structural units shall conform to the requirements of the particular sections of these specifications covering these items. Each complete machinery and structural unit shall be assembled and tested in the shop in the presence of the Contracting Officer unless otherwise directed. Waiving of tests will not relieve the Contractor of responsibility for any fault in operation, workmanship or material that occurs before the completion of the contract or guarantee. After being installed at the site each complete machinery or structural unit shall be operated through a sufficient number of complete cycles to demonstrate to the satisfaction of the Contracting Officer that it meets the specified operational requirements in all respects.

2.3.3 Inspection of Structural Steel Welding

The Contractor shall maintain an approved inspection system and perform required inspections in accordance with Contract Clause CONTRACTOR INSPECTION SYSTEM. Welding shall be subject to inspection to determine conformance with the requirements of AWS D1.1, the approved welding procedures and provisions stated in other sections of these specifications. Nondestructive examination of designated welds will be required. Supplemental examination of any joint or coupon cut from any location in any joint may be required. 100% visual inspection and arbitrary 10% dye penetration.

2.3.3.1 Visual Examination

All visual examination of completed welds shall be cleaned and carefully examined for insufficient throat or leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement and other surface defects to ensure compliance with the requirements of AWS D1.1, Section 3 and Section 9, Part D.

2.3.3.2 Nondestructive Examination

The nondestructive examination of shop and field welds shall be performed as designated or described in the sections of these specifications covering the particular items of work.

a. Testing Agency - The nondestructive examination of welds and the evaluation of examination tests as to the acceptability of the welds shall be performed by a testing agency adequately equipped and competent to perform such services or by the Contractor using suitable equipment and qualified personnel. In either case written approval of the examination procedures is required and the examination tests shall

be made in the presence of the Contracting Officer. The evaluation of examination tests shall be subject to the approval and all records shall become the property of the Government.

b. Examination Procedures - Examination procedures shall conform to the following requirements.

(1) Ultrasonic Testing - Making, evaluating and reporting ultrasonic testing of welds shall conform to the requirements of AWS D1.1, Section 6, Part C. The ultrasonic equipment shall be capable of making a permanent record of the test indications. A record shall be made of each weld tested.

(2) Radiographic Testing - Making, evaluating and reporting radiographic testing of welds shall conform to the requirements of AWS D1.1, Section 6, Part B.

(3) Magnetic Particle Inspection - Magnetic particle inspection of welds shall conform to the applicable provisions of ASTM E 709.

(4) Dye Penetrant Inspection - Dye penetrant inspection of welds shall conform to the applicable provisions of ASTM E 165.

c. Acceptability of Welds - Welds shall be unacceptable if shown to have defects prohibited by AWS D1.1, Subsection 9.25 or possess any degree of incomplete fusion, inadequate penetration or undercutting.

2.3.3.3 Test Coupons

The Government reserves the right to require the Contractor to remove coupons from completed work when doubt as to soundness cannot be resolved by nondestructive examination. Should tests of any two coupons cut from the work of any welder show strengths less than that specified for the base metal it will be considered evidence of negligence or incompetence and such welder shall be removed from the work. When coupons are removed from any part of a structure the members cut shall be repaired in a neat manner with joints of the proper type to develop the full strength of the members. Repaired joints shall be peened as approved or directed to relieve residual stress. The expense for removing and testing coupons, repairing cut members and the nondestructive examination of repairs shall be borne by the Government or the Contractor in accordance with the Contract Clauses INSPECTION AND ACCEPTANCE.

2.3.3.4 Supplemental Examination

When the soundness of any weld is suspected of being deficient due to faulty welding or stresses that might occur during shipment or erection the Government reserves the right to perform nondestructive supplemental examinations before final acceptance. The cost of such inspection will be borne by the Government.

2.3.4 Structural Steel Welding Repairs

Defective welds in the structural steel welding repairs shall be repaired

in accordance with AWS D1.1, Subsection 3.7. Defective weld metal shall be removed to sound metal by use of air carbon-arc or oxygen gouging. Oxygen gouging shall not be used on ASTM A 514/A 514M steel. The surfaces shall be thoroughly cleaned before welding. Welds that have been repaired shall be retested by the same methods used in the original inspection. Except for the repair of members cut to remove test coupons and found to have acceptable welds costs of repairs and retesting shall be borne by the Contractor.

PART 3 EXECUTION

3.1 INSTALLATION

All parts to be installed shall be thoroughly cleaned. Packing compounds, rust, dirt, grit and other foreign matter shall be removed. Holes and grooves for lubrication shall be cleaned. Enclosed chambers or passages shall be examined to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected prior to installation. Disassembly, cleaning and lubrication will not be required except where necessary to place the assembly in a clean and properly lubricated condition. Pipe wrenches, cold chisels or other tools likely to cause damage to the surfaces of rods, nuts or other parts shall not be used for assembling and tightening parts. Bolts and screws shall be tightened firmly and uniformly but care shall be taken not to overstress the threads. When a half nut is used for locking a full nut the half nut shall be placed first and followed by the full nut. Threads of all bolts except high strength bolts, nuts and screws shall be lubricated with an approved lubricant before assembly. Threads of corrosion-resisting steel bolts and nuts shall be coated with an approved antigalling compound. Driving and drifting bolts or keys will not be permitted.

3.1.1 Alignment and Setting

Each machinery or structural unit shall be accurately aligned by the use of steel shims or other approved methods so that no binding in any moving parts or distortion of any member occurs before it is fastened in place. The alignment of all parts with respect to each other shall be true within the respective tolerances required. Machines shall be set true to the elevations shown.

3.2 PROTECTION OF FINISHED WORK

3.2.1 Machined Surfaces

Machined surfaces shall be thoroughly cleaned of foreign matter. All finished surfaces shall be protected by suitable means. Unassembled pins and bolts shall be oiled and wrapped with moisture resistant paper or protected by other approved means. Finished surfaces of ferrous metals to be in bolted contact shall be washed with an approved rust inhibitor and coated with an approved rust resisting compound for temporary protection during fabrication, shipping and storage periods. Finished surfaces of metals which shall be exposed after installation except corrosion resisting steel or nonferrous metals shall be painted as specified in Section 09965 PAINTING HYDRAULIC STRUCTURES AND APPURTENANT WORKS.

3.2.2 Lubrication After Assembly

After assembly all lubricating systems shall be filled with the lubricant specified and additional lubricant shall be applied at intervals as required to maintain the equipment in satisfactory condition until acceptance of the work.

3.3 TESTS

3.3.1 Workmanship

Workmanship shall be of the highest grade and in accordance with the best modern practices to conform with the specifications for the item of work being furnished.

-- End of Section --

SECTION 05502

METALS: MISCELLANEOUS, STANDARD ARTICLES, SHOP FABRICATED ITEMS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSAE)

ASSAE A14.3	(1992) Safety Requirements for Fixed Ladders

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 1	(1992) Carbon Steel Tee Rails
ASTM A 20/A 20M	(1996a) General Requirements for Steel Plates for Pressure Vessels
ASTM A 27/A 27M	(1995) Steel Castings, Carbon, for General Application
ASTM A 36/A 36M	(1996) Carbon Structural Steel
ASTM A 53	(1996) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 109	(1993) Steel, Strip, Carbon, Cold-Rolled
ASTM A 109M	(1991) Steel, Strip, Carbon, Cold-Rolled (Metric)
ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 148/A 148M	(1993b) Steel Castings, High-Strength, for Structural Purposes
ASTM A 153/A 153M	(1995) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 167	(1996) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 176	(1996) Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

ASTM A 193/A 193M	(1996b) Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 194/A 194M	(1996) Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
ASTM A 240/A 240M	(1996) Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A 263	(1994a) Corrosion-Resistant Chromium Steel-Clad Plate, Sheet, and Strip
ASTM A 264	(1994a) Stainless Chromium-Nickel Steel-Clad Plate, Sheet, and Strip
ASTM A 276	(1996) Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A 307	(1994) Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
ASTM A 312/A 312M	(1995a) Seamless and Welded Austenitic Stainless Steel Pipes
ASTM A 320/A 320M	(1994; R 1995) Alloy Steel Bolting Materials for Low-Temperature Service
ASTM A 325	(1996) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(1993) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 484/A 484M	(1994b) General Requirements for Stainless Steel Bars, Billets, and Forgings
ASTM A 490	(1993) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 490M	(1993) High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 500	(1993) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(1993) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

ASTM A 502	(1993) Steel Structural Rivets
ASTM A 504	(1993) Wrought Carbon Steel Wheels
ASTM A 514/A 514M	(1994a) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM A 516/A 516M	(1990) Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
ASTM A 519	(1994) Seamless Carbon and Alloy Steel Mechanical Tubing
ASTM A 564/A 564M	(1995) Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
ASTM A 572/A 572M	(1994c) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 588/A 588M	(1994) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 618	(1993; R 1995) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 668/A 668M	(1996) Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A 730	(1993) Forgings, Carbon and Alloy Steel, for Railway Use
ASTM A 786/A 786M	(1993) Rolled Steel Floor Plates
ASTM B 6	(1995a) Zinc
ASTM B 21	(1996) Naval Brass Rod, Bar, and Shapes
ASTM B 21M	(1996) Naval Brass Rod, Bar, and Shapes (Metric)
ASTM B 23	(1994) White Metal Bearing Alloys (Known Commercially as "Babbitt Metal")
ASTM B 26/B 26M	(1996) Aluminum-Alloy Sand Castings
ASTM B 36/B 36M	(1995) Brass Plate, Sheet, Strip, and Rolled Bar

ASTM B 62	(1993) Composition Bronze or Ounce Metal Casting
ASTM B 121/B 121M	(1995) Leaded Brass Plate, Sheet, Strip, and Rolled Bar
ASTM B 124	(1996) Copper and Copper-Alloy Forging Rod, Bar, and Shapes
ASTM B 124M	(1996) Copper and Copper-Alloy Forging Rod, Bar, and Shapes (Metric)
ASTM B 138	(1996) Manganese Bronze Rod, Bar, and Shapes
ASTM B 138M	(1996) Manganese Bronze Rod, Bar, and Shapes (Metric)
ASTM B 148	(1993a) Aluminum-Bronze Sand Castings
ASTM B 150	(1995a) Aluminum Bronze Rod, Bar, and Shapes
ASTM B 150M	(1995a) Aluminum Bronze Rod, Bar, and Shapes (Metric)
ASTM B 152	(1994) Copper Sheet, Strip, Plate, and Rolled Bar
ASTM B 152M	(1995) Copper Sheet, Strip, Plate, and Rolled Bar (Metric)
ASTM B 176	(1995) Copper-Alloy Die Castings
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 211	(1995a) Aluminum and Aluminum-Alloy Bar, Rod, and Wire
ASTM B 211M	(1995) Aluminum and Aluminum-Alloy Bar, Rod, and Wire (Metric)
ASTM B 241/B 241M	(1996) Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
ASTM B 271	(1996) Copper-Base Alloy Centrifugal Castings
ASTM B 308/B 308M	(1996) Aluminum-Alloy 6061-T6 Standard Structural Shapes

ASTM B 505	(1996) Copper-Base Alloy Continuous Castings
ASTM B 584	(1993b) Copper Alloy Sand Castings for General Applications
ASTM B 749	(1991; R 1991) Lead and Lead Alloy Strip, Sheet, and Plate Products
ASTM B 763	(1996) Copper Alloy Sand Castings for Valve Application
ASTM B 806	(1993a) Copper Alloy Permanent Mold Castings for General Applications
ASTM B 824	(1996) General Requirements for Copper Alloy Castings
ASTM F 436	(1993) Hardened Steel Washers
ASTM F 436M	(1993) Hardened Steel Washers (Metric)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B16.3	(1992) Malleable Iron Threaded Fittings
ASME B16.5	(1988; Errata Oct 88; B16.5a) Pipe Flanges and Flanged Fittings
ASME B16.9	(1993) Factory-Made Wrought Steel Buttwelding Fittings
ASME B18.2.1	(1981; Supple 1991; R 1992) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)
ASME B18.3	(1986; R 1995) Socket Cap, Shoulder and Set Screws (Inch Series) Including Dimensions of Hexagon and Spline Sockets and Keys to Match
ASME B18.6.1	(1981; R 1991) Wood Screws (Inch Series)
ASME B18.6.2	(1972; R 1993) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws
ASME B18.6.3	(1972; R 1991) Machine Screws and Machine Screw Nuts
ASME B18.21.1	(1994) Lock Washers (Inch Series)

ASME B18.22.1	(1965; R 1990) Plain Washers
ASME B18.22M	(1981; R 1990) Metric Plain Washers
ASME B27.7	(1977; R 1993) General Purpose Tapered and Reduced Cross Section Retaining Rings

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1922	(Rev A) Shield, Expansion (Caulking Anchors, Single Lead)
CID A-A-1923	(Rev A) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-1924	(Rev A; Notice 1) Shield, Expansion (Shelf Drilling Tubular Expansion Shell Bolt Anchors)
CID A-A-1925	(Rev A; Notice 1) Shield, Expansion (Nail Anchors)
CID A-A-55614	(Rev A) Shield, Expansion (Non-Drilling Expansion Anchors)
CID A-A-55615	(Rev A) Shield, Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)

FEDERAL SPECIFICATIONS (FS)

FS FF-B-588	(Rev E) Bolt, Toggle and Expansion Sleeve Screw
FS RR-C-271	(Rev D) Chains and Attachments, Welded and Weldless
FS RR-F-621	(Rev E) Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole
FS RR-T-650	(Rev E) Treads, Metallic and Nonmetallic, Skid Resistant
FS RR-W-410	(Rev D; Am 1) Wire Rope and Strand

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531	(1993) Metal Bar Grating Manual
NAAMM MBG 531S	(1989) Guide Specification for Stainless Steel Grating

1.2 SUBMITTALS

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

SD-04 Drawings

Shop Fabricated Metal Items; GA.

Detail drawings shall be submitted for approval as specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-07 Schedules

Miscellaneous Metals and Standard Metal Articles; GA. Shop Fabricated Metal Items; GA.

Lists of materials shall be submitted for approval as specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-09 Reports

Miscellaneous Metals and Standard Metal Articles; GA. Shop Fabricated Metal Items; GA.

Certified test reports for materials tests and analyses shall be submitted for approval as specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-14 Samples

Miscellaneous Metals and Standard Metal Articles; FIO. Shop Fabricated Metal Items; FIO.

Samples shall be submitted for approval as specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS. Samples of standard or fabricated items shall be full size and complete as required for installation in the work, and may be installed in the work, provided each sample is clearly identified and its location recorded.

SD-18 Records

Miscellaneous Metals and Standard Metal Articles; FIO. Shop Fabricated Metal Items; FIO.

Records which identify the disposition of approved material and fabricated items in the work must be submitted for approval as specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

1.3 FABRICATION AND WORKMANSHIP REQUIREMENTS

Fabrication requirements and workmanship provisions for items specified in this section shall conform with the requirements of Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

PART 2 PRODUCTS

2.1 MISCELLANEOUS METALS AND STANDARD METAL ARTICLES

Miscellaneous metal materials and standard metal articles shall conform to the respective specifications and other designated requirements. Sizes shall be as specified or shown. Where material requirements are not specified, materials furnished shall be suitable for the intended use and shall be subject to approval.

2.1.1 Structural Steel

ASTM A 36/A 36M.

2.1.2 Steel Plates

2.1.2.1 Structural

ASTM A 514/A 514M, Grade A.

2.1.3 Steel Tubing

2.1.3.1 Structural

ASTM A 500, Grade A, seamless nominal wall thickness as shown.

2.1.4 Steel Pipes and Pipe Fittings

2.1.4.1 Pipes

ASTM A 53, Type S, Grade A, seamless, nominal size and weight class or outside diameter and nominal wall thickness as shown.

2.1.5 Stainless Steel

2.1.5.1 Plate, Sheet, and Strip

ASTM A 240/A 240M, UNS S30400. Plate finish shall be hot-rolled and annealed or heat treated, and blast cleaned or pickled. Sheet and strip finish shall be No. 1.

2.1.5.2 Bars and Shapes

Stainless steel bars and shapes shall conform to the following as specified or shown:

a. ASTM A 276, UNS S30400, S40500, or S41000 with a maximum carbon content of 0.08 percent, Condition A, hot-finished or cold- finished, Class C.

b. ASTM A 564/A 564M, UNS S17400 or S45000, age-hardened heat treatment condition, hot-finished or cold-finished, Class C.

2.1.5.3 Pipe

ASTM A 312/A 312M, welded, UNS S30400, NPS and schedule number or outside diameter and nominal wall thickness as shown, threaded and coupled ends.

2.1.6 Bolts, Nuts, and Washers

Bolts, nuts, and washers shall be of the material, grade, type, class, style and finish indicated or best suited for intended use.

2.1.6.1 High-Strength Bolts, Nuts, and Washers

ASTM A 325, Type 1, hot-dip galvanized.

2.1.6.2 Bolts, Nuts, and Washers (Other Than High-Strength)

a. Bolts and Nuts - ASTM A 307, Grade A, hot-dip galvanized.

b. Bolts - ASME B18.2.1.

c. Nuts - ASME B18.2.2.

d. Washers

(1) Plain Washers - ASME B18.22.1, Type B.

(2) Lock Washer - ASME B18.21.1.

2.1.7 Screws

Screws shall be of the material, grade, type, style, and finish indicated or best suited for use intended.

2.1.7.1 Cap Screws

ASME B18.2.1, ASME B18.3, or ASME B18.6.2 as required.

2.1.7.2 Machine Screws

ASME B18.6.3.

2.1.7.3 Wood Screws

ASME B18.6.1.

2.1.7.4 Set Screws

ASME B18.6.2.

2.1.8 Toggle Bolts

FS FF-B-588.

2.1.9 Steel Rails

ASTM A 1, No. 1.

2.1.10 Steel Wheels

ASTM A 504.

2.1.11 Steel Floor Plate

ASTM A 786/A 786M.

2.2 SHOP FABRICATED METAL ITEMS

Shop fabricated metal items shall conform to the requirements and details as specified or shown and to the workmanship provisions and other applicable fabrication requirements as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.2.1 Gratings and Cover Plates

Grating and cover plates shall be of the material and size shown, and shall be fabricated in sectional panels of the width and length shown, or as appropriate, to accurately fit within the supporting recess frames. Openings through panels shall be provided as shown or as required. Hinged panels shall be provided with hinges of the type shown or suitable for the application. Steel gratings and cover plates shall be galvanized after fabrication.

2.2.1.1 Grating

Gratings shall be as specified in paragraph FLOOR GRATINGS. Edges of gratings and openings through gratings which require the cutting of more than one bearing bar shall be banded. Fasteners shall be of the type recommended by the manufacturer and approved.

2.2.1.2 Cover Plates

Cover plates shall be as specified in paragraph STEEL FLOOR PLATE. Cover plate panels shall be provided with 1/4 inch bar, flush, drop handles for removal as shown or as required. Sharp edges and burrs shall be removed from plates.

2.2.2 Ladders

Ladders shall be fixed-rail metal ladders conforming to the requirements of ASSAE A14.3 and to details shown. Ladders shall be fabricated of structural steel as shown and shall be galvanized after fabrication . Fabrication of ladders shall consist of solid-section rod rungs fitted into holes in bar side rails and welded. Splices in side rails shall be made using full penetration welds and shall provide a flush and smooth transition between connecting ends. All welds shall be ground smooth Ladder rails shall be welded to bent-bar supporting brackets anchored to supporting structure as shown.

2.2.3 Ladder Rungs

Ladder rungs shall be fabricated from steel rods in accordance with the details and shall be galvanized after fabrication.

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 09940

PAINTING: HYDRAULIC STRUCTURES

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z87.1	(1989; Z87.1a) Occupational and Educational Eye and Face Protection
ANSI Z358.1	(1990) Emergency Eyewash Shower Equipment

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 304	(1990) N-Butyl Alcohol (Butanol)
ASTM D 561	(1982; R 1989) Carbon Black Pigment for Paint
ASTM D 740	(1989) Methyl Ethyl Ketone
ASTM D 770	(1990) Isopropyl Alcohol
ASTM D 841	(1990) Nitration Grade Toluene
ASTM D 843	(1990) Nitration Grade Xylene
ASTM D 1045	(1986; R 1990) Sampling and Testing Plasticizers Used in Plastics
ASTM D 1153	(1990) Methyl Isobutyl Ketone
ASTM D 1186	(1987) Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
ASTM D 1200	(1988) Viscosity by Ford Viscosity Cup
ASTM D 1210	(1979; R 1988) Fineness of Dispersion of Pigment-Vehicle Systems
ASTM D 1400	(1987) Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base

ASTM D 2917	(1991) Methyl Isoamyl Ketone
ASTM D 4258	(1999) Standard Practice for Surface Cleaning Concrete for Coating
ASTM D 4360	(1990) Methyl n-Amyl Ketone
ASTM D 4417	(1984) Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM E 1347	(1990) Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.94	Ventilation
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910, Subpart I	Personal Protective Equipment
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261, App II, Mtd 1311	Toxicity Characteristic Leaching Procedure (TCLP)
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 262.22	Number of Copies
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
49 CFR 171, Subchapter C	Hazardous Materials Regulations

ENGINEERING MANUALS (EM)

EM 385-1-1	U.S. Army Corps of Engineers Safety and Health Requirements Manual

FEDERAL SPECIFICATIONS (FS)

FS TT-P-38	(Rev E) Paint, Aluminum (Ready-Mixed)

MACBETH DIVISION (MD)

MD-40219	(Matte Edition) Munsell Book of Color: Matte Finish Collection

MILITARY SPECIFICATIONS (MS)

MS DOD-P-15328	(Rev D; Am 1; Int Am 2; Notice 1) Primer (Wash), Pretreatment (Formula No. 117 for Metals (Metric)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1993) National Electrical Code

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (without Lead and Chromate Pigments)
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 3	(1989) Power Tool Cleaning
SSPC SP 5	(1991) White Metal Blast Cleaning
SSPC SP 7	(1991) Brush-Off Blast Cleaning

1.2 WORK PERFORMANCE

Work shall be performed in accordance with the requirements of 29 CFR 1910, 29 CFR 1926, EM 385-1-1, and other references as listed herein. Matters of interpretation of the standards shall be submitted to the Contracting Officer for resolution before starting work. Where the regulations conflict, the most stringent requirements shall apply.

1.3 SUBMITTALS

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

SD-08 Statements

Waste Classification, Handling, and Disposal Plan; GA.

The Contractor is responsible for assuring the proper disposal of all hazardous and nonhazardous waste generated during the project. Therefore, the contractor shall develop a Waste Classification, Handling, and Disposal Plan for all job sites in accordance with the requirements of 40 CFR 261

and 40 CFR 262. In addition, the following provisions shall be included:

a. In the case of waste generated from abrasive blasting lead-containing paints with recyclable steel or iron abrasives, the spent abrasive shall be disposed of as a hazardous waste or shall be stabilized with proprietary blast additives regardless of the results of 40 CFR 261, App II, Mtd 1311. Where stabilization is preferred, the contractor shall employ a proprietary blast additive during blasting operations.

b. Hazardous waste shall be placed in closed containers and shall be shielded adequately to prevent dispersion of the waste by wind or water. Any evidence of improper storage shall be cause for immediate shutdown of the project until corrective action is taken.

c. Nonhazardous waste shall be stored in closed containers separate from hazardous waste storage areas.

d. All hazardous waste shall be transported by a licensed transporter in accordance with 40 CFR 263 and 49 CFR 171, Subchapter C.

e. All nonhazardous waste shall be transported in accordance with local regulations regarding waste transportation.

f. In addition to the number of manifest copies required by 40 CFR 262.22, one copy of each manifest will be supplied to the Contracting Officer prior to transportation.

SD-14 Samples

Special Paint Formulas; GA.

Samples of special paint formulas, listed in paragraph PAINT FORMULATIONS, shall be submitted. For all vinyl-type paints submitted for laboratory testing, separate 1/2-pint samples of ingredient raw materials shall be furnished. The ingredient samples shall be clearly identified by commercial name, trade designation, manufacturer, batch or lot number, and such other data as may be required. For all epoxy type paints submitted for laboratory testing, a list of ingredient raw materials identifying commercial name, trade designation, manufacturer, batch or lot number, and such other data as may be required shall be furnished.

Specification and Proprietary Paints; GA.

Federal, Military, and Steel Structures Painting Council specification paints are those formulated to meet Federal, military, and industry specifications. When the required quantity of any type is 50 gallons or less, the Contractor can submit:

a. A certified test report showing the results of required tests made on the material and a statement that it meets all of the specification requirements.

b. A certified test report showing the results of required tests made

on a previous batch of paint produced by the same firm using the same ingredients and formulation except for minor differences necessitated by a color change and a statement that the previous batch met all of the specification requirements. A report of tests on the proposed batch showing the following properties applicable to the material specifications shall be furnished: color, gloss, drying time, opacity, viscosity, weight per gallon, and fineness of grind.

c. A proprietary paint - When the required quantity of a particular type or color of a paint is 10 gallons or less, a proprietary, name-brand, shelf item paint of the same type and with similar properties to the material specified may be proposed without sampling. Proprietary paints are any which do not follow the formulas in paragraph PAINT FORMULATIONS or the complete specification requirements of Federal, Military, and Steel Structures Painting Council specifications. To receive consideration, a statement from the supplier that the paint is appropriate as to type, color, and gloss and is a premium grade of paint shall be furnished.

Thinners; GA.

Samples shall be submitted of the thinners which are those solvents used to reduce the viscosity of the paint.

SD-18 Records

Inspections and Operations; GA.

The Contractor shall document and submit records of inspections and operations performed. Submittals shall be made on a timely basis and shall include but are not limited to:

a. Inspections performed, including the area of the structure involved and the results of the inspection.

b. Surface preparation operations performed, including the area of the structure involved, the mode of preparation, the kinds of solvent, abrasive, or power tools employed, and whether contract requirements were met.

c. Thinning operations performed, including thinners used, batch numbers, and thinner/paint volume ratios.

d. Application operations performed, including the area of the structure involved, mode of application employed, ambient temperature, substrate temperature, dew point, relative humidity, type of paint with batch numbers, elapsed time between surface preparation and application, elapsed time for recoat, condition of underlying coat, number of coats applied, and if specified, measured dry film thickness or spreading rate of each new coating.

1.4 QUALIFICATIONS

Qualifications and experience shall comply with the following.

1.4.1 Certified Professional

The Contractor shall provide a person who is qualified and competent as defined in Section 01 of EM 385-1-1, will develop the required safety and health submittal, and will be responsible for on-site safety and health during the contract period. The person shall be a Certified Industrial Hygienist (CIH), an Industrial Hygienist (IH), or a Certified Safety Professional (CSP) with a minimum of 3 years of demonstrated experience in similar related work. The Contractor shall certify that the Certified Industrial Hygienist (CIH) holds current and valid certification from the American Board of Industrial Hygiene (ABIH), that the IH is considered board eligible by written confirmation from the ABIH, or that the CSP holds current and valid certification from the American Board of Certified Safety Professionals. The CIH, IH, or CSP may utilize other qualified and competent persons, as defined in EM 385-1-1, to conduct on-site safety and health activities as long as these persons have a minimum of 3 years of demonstrated experience in similar related work and are under the direct supervision of the CIH, IH, or CSP. For lead containing jobsites, the competent and qualified person shall have successfully completed an EPA or state accredited lead-based paint abatement Supervisor course specific to the work to be performed and shall possess current and valid state and/or local government certification, as required.

1.4.2 Certified Laboratory

The Contractor shall provide documentation which includes the name, address, and telephone number of the laboratories to be providing services. In addition, the documentation shall indicate that each laboratory is an EPA National Lead Laboratory Accreditation Program (NLLAP) accredited laboratory and that each is rated proficient in the NIOSH/EPA Environmental Lead Proficiency Analytical Testing Program (ELPAT)and will document the date of current accreditation. Certification shall include accreditation for heavy metal analysis, list of experience relevant to analysis of lead in air, and a Quality Assurance and Quality Control Program.

1.5 SAFETY AND HEALTH PROVISIONS

Paragraph SAFETY AND HEALTH PROVISIONS supplements the requirements of EM 385-1-1, paragraph (1). In any conflict between Section 01 of EM 385-1-1 and this paragraph, the provisions herein shall govern.

1.5.1 Abrasive Blasting

The Contractor shall comply with the requirements in Section 06.H of EM 385-1-1.

1.5.1.1 Hoses And Nozzles

In addition to the requirements in Section 20 of EM 385-1-1, hoses and hose connections of a type to prevent shock from static electricity shall be used. Hose lengths shall be joined together by approved couplings of a material and type designed to prevent erosion and weakening of the couplings. The couplings and nozzle attachments shall fit on the outside

of the hose and shall be designed to prevent accidental disengagement.

1.5.1.2 Workers Other Than Blasters

Workers other than blasting operators working in close proximity to abrasive blasting operations shall be protected by utilizing MSHA/NIOSH-approved half-face or full-face air purifying respirators equipped with high-efficiency particulate air (HEPA) filters, eye protection meeting or exceeding ANSI Z87.1 and hearing protectors (ear plugs and/or ear muffs) providing at least 20 dBA reduction in noise level.

1.5.2 Cleaning with Compressed Air

Cleaning with compressed air shall be in accordance with Section 20.B.5 of EM 385-1-1 and personnel shall be protected as specified in 29 CFR 1910.134.

1.5.3 Cleaning with Solvents

1.5.3.1 Ventilation

Ventilation shall be provided where required by 29 CFR 1910.146 or where the concentration of solvent vapors exceeds 10 percent of the Lower Explosive Limit (LEL). Ventilation shall be in accordance with 29 CFR 1910.94, paragraph (c)(5).

1.5.3.2 Personal Protective Equipment

Personal protective equipment shall be provided where required by 29 CFR 1910.146 and in accordance with 29 CFR 1910, Subpart I.

1.5.4 Pretreatment of Metals and Concrete with Acids

1.5.4.1 Personal Protective Equipment

Personnel shall be protected in accordance with 29 CFR 1910, Subpart I.

1.5.4.2 Emergency Equipment

In addition to the requirements of Section 05 of EM 385-1-1, the contractor shall provide an eyewash in accordance with ANSI Z358.1, paragraph (6).

1.5.5 Mixing Epoxy Resin Formulations

1.5.5.1 Exhaust Ventilation

Local exhaust ventilation shall be provided in the area where the curing agent and resin are mixed. This ventilation system shall be capable of providing at least 100 linear feet per minute of capture velocity measured at the point where the curing agent and resin contact during mixing.

1.5.5.2 Personal Protective Equipment

Exposure of skin and eyes to epoxy resin components shall be avoided by wearing appropriate chemically resistant gloves, apron, safety goggles, and

face shields meeting or exceeding the requirements of ANSI Z87.1.

1.5.5.3 Emergency Equipment

A combination unit, comprised of an eyewash and deluge shower, within close proximity to the epoxy resin mixing operation shall be provided in accordance with ANSI Z358.1, paragraph (9).

1.5.6 Paint Application

1.5.6.1 Ventilation

When using solvent-based paint in confined spaces, ventilation shall be provided to exchange air in the space at a minimum rate of 5,000 cubic feet per minute per spray gun in operation. It may be necessary to install both a mechanical supply and exhaust ventilation system to effect adequate air changes within the confined space. All air-moving devices shall be located and affixed to an opening of the confined space in a manner that assures that the airflow is not restricted or short circuited and is supplied in the proper direction. Means of egress shall not be blocked. Ventilation shall be continued after completion of painting and through the drying phase of the operation. If the ventilation system fails or the concentration of volatiles exceeds 10 percent of the LEL (except in the zone immediately adjacent to the spray nozzle), painting shall be stopped and spaces evacuated until such time that adequate ventilation is provided. An audible alarm that signals system failure shall be an integral part of the ventilation system. The effectiveness of the ventilation shall be checked by using ventilation smoke tubes and making frequent oxygen and combustible gas readings during painting operations. Exhaust ducts shall discharge clear of the working areas and away from possible sources of ignition.

1.5.6.2 Explosion Proof Equipment

Electrical wiring, lights, and other equipment located in the paint spraying area shall be of the explosion proof type designed for operation in Class I, Division 1, Group D, hazardous locations as required by the NFPA 70. Electrical wiring, motors, and other equipment, outside of but within 20 feet of any spraying area, shall not spark and shall conform to the provisions for Class I, Division 2, Group D, hazardous locations. Electric motors used to drive exhaust fans shall not be placed inside spraying areas or ducts. Fan blades and portable air ducts shall be constructed of nonferrous materials. Motors and associated control equipment shall be properly maintained and grounded. The metallic parts of air-moving devices, spray guns, connecting tubing, and duct work shall be electrically bonded and the bonded assembly shall be grounded.

1.5.6.3 Further Precautions

a. Workers shall wear nonsparking safety shoes.

b. Solvent drums taken into the spraying area shall be placed on nonferrous surfaces and shall be grounded. Metallic bonding shall be maintained between containers and drums when materials are being

transferred.

c. Insulation on all power and lighting cables shall be inspected to ensure that the insulation is in excellent working condition and is free of all cracks and worn spots. Cables shall be further inspected to ensure that no connections are within 50 feet of the operation, that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing.

1.5.6.4 Ignition Sources

Ignition sources, to include lighted cigarettes, cigars, pipes, matches, or cigarette lighters shall be prohibited in area of solvent cleaning, paint storage, paint mixing, or paint application.

1.5.7 Health Protection

1.5.7.1 Respirators

During all spray painting operations, spray painters shall use approved SCBA or SAR (air line) respirators, unless valid air sampling has demonstrated contaminant levels to be consistently within concentrations that are compatible with air-purifying respirator Assigned Protection Factor (APF). Persons with facial hair that interferes with the sealing surface of the facepiece to faceseal or interferes with respirator valve function shall not be allowed to perform work requiring respiratory protection. Air-purifying chemical cartridge/canister half- or full-facepiece respirators that have a particulate prefilter and are suitable for the specific type(s) of gas/vapor and particulate contaminant(s) may be used for nonconfined space painting, mixing, and cleaning (using solvents). These respirators may be used provided the measured or anticipated concentration of the contaminant(s) in the breathing zone of the exposed worker does not exceed the APF for the respirator and the gas/vapor has good warning properties or the respirator assembly is equipped with a NIOSH-approved end of service life indicator for the gas(es)/vapor anticipated or encountered. Where paint contains toxic elements such as lead, cadmium, chromium, or other toxic particulates that may become airborne during painting in nonconfined spaces, air-purifying half-and full-facepiece respirators or powered air-purifying respirators equipped with appropriate gas vapor cartridges, in combination with a high-efficiency filter, or an appropriate canister incorporating a high-efficiency filter, shall be used.

1.5.7.2 Protective Clothing and Equipment

All workers shall wear safety shoes or boots, appropriate gloves to protect against the chemical to be encountered, and breathable, protective, full-body covering during spray-painting applications. Where necessary for emergencies, protective equipment such as life lines, body harnesses, or other means of personnel removal shall be used during confined-space work.

1.6 PAINT PACKAGING, DELIVERY, AND STORAGE

Paints shall be processed and packaged to ensure that within a period of

one year from date of manufacture, they will not gel, liver, or thicken deleteriously, or form gas in the closed container. Paints, unless otherwise specified or permitted, shall be packaged in standard containers not larger than 5 gallons, with removable friction or lug-type covers. Containers for vinyl-type paints shall be lined with a coating resistant to solvents in the formulations and capable of effectively isolating the paint from contact with the metal container. Each container of paint or separately packaged component thereof shall be labeled to indicate the purchaser's order number, date of manufacture, manufacturer's batch number, quantity, color, component identification and designated name, and formula or specification number of the paint together with special labeling instructions, when specified. Paint shall be delivered to the job in unbroken containers. Paints that can be harmed by exposure to cold weather shall be stored in ventilated, heated shelters. All paints shall be stored under cover from the elements and in locations free from sparks and flames.

PART 2 PRODUCTS

2.1 SPECIAL PAINT FORMULAS

Special paints shall have the composition as indicated in the formulas listed herein. Where so specified, certain components of a paint formulation shall be packaged in separate containers for mixing on the job. If not specified or otherwise prescribed, the color shall be that naturally obtained from the required pigmentation.

2.2 PAINT FORMULATIONS

Special paint formulas shall comply with the following.

2.2.1 Formula V-766e, Vinyl-Type White (or Gray) Paint

INGREDIENTS	PERCENT BY WEIGHT
Vinyl Resin, Type 3	5.6
Vinyl Resin, Type 4	11.6
Titanium Dioxide and (for Gray) Carbon Black	13.0
Diisodecyl Phthalate	2.9
Methyl Isobutyl Ketone	32.0
Toluene	34.7
Ortho-Phosphoric Acid	0.2

	100.0

a. The dispersion of pigment shall be accomplished by means of pebble mills or other approved methods to produce a fineness of grind (ASTM D 1210) of not less than 7 on the Hegman scale. Grinding in steel-lined or steel-ball mills will not be permitted. No grinding aids, antisettling agents, or any other materials except those shown in the formula will be permitted. The paint shall show the proper proportions of specified materials when analyzed by chromatographic and/or spectrophotometric methods. The ortho-phosphoric acid shall be

measured accurately and diluted with at least four parts of ketone to one part of acid and it shall be slowly incorporated into the finished paint with constant and thorough agitation.

b. The viscosity of the paint shall be between 60 and 90 seconds using ASTM D 1200 and a No. 4 Ford cup.

c. The white and gray paints shall be furnished in the volume ratio designated by the purchaser. The gray paint shall contain no pigments other than those specified. Enough carbon black shall be included to produce a dry paint film having a reflectance of 20-24 (ASTM E 1347). The resulting gray color will approximate Munsell color 2.5PB 5/2 identified in MD-40219.

2.3 INGREDIENTS FOR SPECIAL PAINT FORMULAS

The following ingredient materials and thinners apply only to those special paints whose formulas are shown above in detail.

2.3.1 Pigments and Suspending Agents

2.3.1.1 Carbon Black

Carbon black shall conform to ASTM D 561, Type I or II.

2.3.1.2 Titanium Dioxide

Titanium dioxide in vinyl paint Formula V-766e shall be one of the following: Kronos 2160 or 2101, Kronos, Inc.; Ti-Pure 960, E.I. Dupont DeNemours and Co., Inc.; Unitane OR-650, Kermira, Inc.

2.3.2 Resins, Plasticizer, and Catalyst

2.3.2.1 Diisodecyl Phthalate

Diisodecyl Phthalate shall have a purity of not less than 99.0 percent, shall contain not more than 0.1 percent water, and shall have an acid number (ASTM D 1045) of not more than 0.10.

2.3.2.2 Vinyl Resin, Type 3

Vinyl resin, Type 3, shall be a vinyl chloride-acetate copolymer of medium average molecular weight produced by a solution polymerization process and shall contain 85 to 88 percent vinyl chloride and 12 to 15 percent vinyl acetate by weight. The resin shall have film-forming properties and shall, in specified formulations, produce results equal to Vinylite resin VYHH, as manufactured by the Union Carbide Corporation.

2.3.2.3 Vinyl Resin, Type 4

Vinyl resin, Type 4, shall be a copolymer of the vinyl chloride-acetate type produced by a solution polymerization process, shall contain (by weight) 1 percent interpolymerized dibasic acid, 84 to 87 percent vinyl chloride, and 12 to 15 percent vinyl acetate. The resin shall have

film-forming properties and shall, in the specified formulations, produce results equal to Vinylite resin VMCH, as manufactured by the Union Carbide Corporation.

2.3.2.4 Polyamide Resin

The polyamide resin for Formula E-303d shall be a condensation product of a dimerized fatty acid and polyamines. It shall be a solid resin at room temperature and have the following characteristics:

	MINIMUM	MAXIMUM
Amine value	85	95
Color (Gardner)	--	12
Specific Gravity, 25/25 degree C 0.97	0.99	
Viscosity, Poises, 150 degrees C (Brookfield)	7	9

2.3.2.5 Ortho-phosphoric Acid

Ortho-phosphoric acid shall be a chemically pure 85-percent grade.

2.3.3 Solvent and Thinners

2.3.3.1 Isopropanol

Isopropyl alcohol shall conform to ASTM D 770.

2.3.3.2 Butanol

Butanol (butyl alcohol) shall conform to ASTM D 304.

2.3.3.3 Methyl Ethyl Ketone

Methyl ethyl ketone (MEK) shall conform to ASTM D 740.

2.3.3.4 Methyl Isobutyl Ketone

Methyl isobutyl ketone (MIBK) shall conform to ASTM D 1153.

2.3.3.5 Methyl Isoamyl Ketone

Methyl isoamyl ketone (MIAK) shall conform to ASTM D 2917.

2.3.3.6 Methyl n-Amyl Ketone

Methyl n-amyl ketone (MAK) shall conform to ASTM D 4360.

2.3.3.7 Toluene

Toluene shall conform to ASTM D 841.

2.3.3.8 Xylene

Xylene shall conform to ASTM D 843.

2.3.4 Silane B

Silane B for Formula VZ-108d shall be N-beta-(aminoethyl)-gamma-aminopropyltrimethoxy silane. Silane A-1120, produced by the Union Carbide Corporation, and Silane Z-6020, produced by Dow Chemical Company, are products of this type.

2.3.5 Propylene Oxide

Propylene oxide shall be a commercially pure product suitable for intended use.

2.4 TESTING

2.4.1 Chromatographic Analysis

Solvents in vinyl and epoxy paints and thinners shall be subject to analysis by programmed temperature gas chromatographic methods and/or spectrophotometric methods, employing the same techniques that give reproducible results on prepared control samples known to meet the specifications. If the solvent being analyzed is of the type consisting primarily of a single chemical compound or a mixture or two or more such solvents, interpretation of the test results shall take cognizance of the degree of purity of the individual solvents as commercially produced for the paint industry.

2.4.2 Vinyl Paints

Vinyl paints shall be subject to the following adhesion test. When V-766 or V-106 formulations are tested, 5 to 7 mils (dry) shall be spray applied to mild steel panels. The steel panels shall be essentially free of oil or other contaminants that may interfere with coating adhesion. The test panels shall be dry blast cleaned to a White Metal grade which shall be in compliance with SSPC SP 5. The surface shall have an angular profile of 2.0 to 2.5 mils as measured by ASTM D 4417, Method C. When V-102 or V-103 formulations are tested, they shall be spray applied over 1.5 to 2.5 mils (dry) of V-766 or V-106 known to pass this test. When VZ-108 is tested, the coating shall be mixed in its proper proportions and then spray applied to a dry film thickness of 1.5 to 2.5 mils above the blast profile. The VZ-108 shall be top coated with a V-766 known to pass this test. In all cases, the complete system shall have a total dry film thickness of 5 to 7 mils above the blast profile. After being air dried for 2 hours at room temperature, the panel shall be dried in a vertical position for 16 hours at 120 degrees F. After cooling for 1 hour, the panel shall be immersed in tap water at 85 to 90 degrees F for 48 to 72 hours. Immediately upon removal, the panel shall be dried with soft cloth and examined for adhesion as follows: With a pocket knife or other suitable instrument, two parallel cuts at least 1 inch long shall be made 1/4 to 3/8 inch apart through the paint film to the steel surface. A third cut shall be made perpendicular to and passing through the end of the first two. With the tip of the knife

blade, the film shall be loosened from the panel from the third cut between the parallel cuts for a distance of 1/8 to 1/4 inch. With the panel being held horizontally, the free end of the paint film shall be grasped between the thumb and forefinger and pulled vertically in an attempt to remove the film as a strip from between the first two cuts. The strip of paint film shall be removed at a rate of approximately 1/10 inch per second and shall be maintained in a vertical position during the process of removal. The adhesion is acceptable if the strip of paint breaks when pulled or if the strip elongates a minimum of 10 percent during its removal. Paints not intended to be self-priming shall exhibit no delamination from the primer.

PART 3 EXECUTION

3.1 CLEANING AND PREPARATION OF SURFACES TO BE PAINTED

3.1.1 General Requirements

Surfaces to be painted shall be cleaned before applying paint or surface treatments. Deposits of grease or oil shall be removed in accordance with SSPC SP 1, prior to mechanical cleaning. Solvent cleaning shall be accomplished with mineral spirits or other low toxicity solvents having a flashpoint above 100 degrees F. Clean cloths and clean fluids shall be used to avoid leaving a thin film of greasy residue on the surfaces being cleaned. Items not to be prepared or coated shall be protected from damage by the surface preparation methods. Machinery shall be protected against entry of blast abrasive and dust into working parts. Cleaning and painting shall be so programmed that dust or other contaminants from the cleaning process do not fall on wet, newly painted surfaces, and surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Welding of, or in the vicinity of, previously painted surfaces shall be conducted in a manner to prevent weld spatter from striking the paint and to otherwise reduce coating damage to a minimum; paint damaged by welding operations shall be restored to original condition. Surfaces to be painted that will be inaccessible after construction, erection, or installation operations are completed shall be painted before they become inaccessible.

3.1.2 Ferrous Surfaces Subject to Normal Exposure

Ferrous surfaces that are to be continuously in exterior or interior atmospheric exposure and other surfaces as directed shall be cleaned by means of power tools or by dry blasting to the brushoff grade. Cleaning and priming shall be done in the shop unless otherwise directed or permitted. Power tool cleaning shall conform to the requirements of SSPC SP 3. Brushoff blast cleaning shall conform to the requirements of SSPC SP 7. Regardless of the overall cleaning method used, welds and adjoining surfaces within a few inches thereof shall be cleaned of weld flux, spatter, and other harmful deposits by blasting, power impact tools, power wire brush, or such combination of these and other methods as may be necessary for complete removal of each type of deposit. The combination of cleaning methods need not include blasting when preparation of the overall surfaces is carried out by the power tool method. However, brush scrubbing and rinsing with clean water, after mechanical cleaning is completed, will be required unless the latter is carried out with thoroughness to remove

all soluble alkaline deposits. Wetting of the surfaces during water-washing operations shall be limited to the weld area required to be treated, and such areas shall be dry before painting. Welds and adjacent surfaces cleaned thoroughly by blasting alone will be considered adequately prepared provided that weld spatter not dislodged by the blast stream shall be removed with impact or grinding tools. All surfaces shall be primed as soon as practicable after cleaning but prior to contamination or deterioration of the prepared surfaces. To the greatest degree possible, steel surfaces shall be cleaned (and primed) prior to lengthy outdoor storage to minimize breakdown of mill scale and consequent rusting.

3.1.3 Ferrous Surfaces Subject to Severe Exposure

Ferrous surfaces subject to extended periods of immersion or as otherwise required shall be dry blast-cleaned to SSPC SP 5. The blast profile, unless otherwise specified, shall be 1.5 to 2.5 mils as measured by ASTM D 4417, Method C. Appropriate abrasive blast media shall be used to produce the desired surface profile and to give an angular anchor tooth pattern. If recycled blast media is used, an appropriate particle size distribution shall be maintained so that the specified profile is consistently obtained. Steel shot or other abrasives that do not produce an angular profile shall not be used. Weld spatter not dislodged by blasting shall be removed with impact or grinding tools and the areas reblasted prior to painting. Surfaces shall be dry at the time of blasting. Blast cleaning to SSPC SP 5 shall be done in the field and, unless otherwise specifically authorized, after final erection. Within 8 hours after cleaning, prior to the deposition of any detectable moisture, contaminants, or corrosion, all ferrous surfaces blast cleaned to SSPC SP 5 shall be cleaned of dust and abrasive particles by brush, vacuum cleaner, and/or blown down with clean, dry, compressed air, and given the first coat of paint. Upon written request by the Contractor, the Contracting Officer may authorize mill or shop cleaning of assembled or partially assembled components specified to receive one of the vinyl-type paint systems or systems No. 6-A-Z, 21-A-Z, and 21-B-Z employing the epoxy zinc-rich primer. The surfaces, if shop blasted, shall be shop coated with the first and second coats of the specified paint system except that the epoxy zinc-rich primed surfaces shall receive an extra single spray coat of the zinc primer at the time field painting is started, as specified in the paint system instructions. The shop coating shall be maintained in good condition by cleaning and touching up of areas damaged during the construction period. If pinpoint or general rusting appears, surfaces shall be reblasted and repainted at no added cost to the Government. Prior to the field application of subsequent coats, soiled areas of the shop coating shall be thoroughly cleaned and all welds or other unpainted or damaged areas shall be cleaned and coated in a manner to make them equivalent to adjacent, undamaged paint surfaces.

3.1.4 Galvanized, Aluminum, Aluminum Alloy, or Copper Surfaces

Where surfaces are specified to be painted, they shall be first washed with clean mineral spirits and then pretreated with a primer conforming to MS DOD-P-15328 in accordance with the following instructions. The pretreatment primer shall be mixed by adding one volume of acid component (diluent) to four volumes of resin component (base solution) slowly and with constant stirring. After mixing, the material shall be used within 8

hours. The pretreatment primer shall be spray applied at a coverage rate of 250 to 300 square feet per gallon (of resin component) to give a dry film thickness of 0.3 to 0.5 mil. Small areas may be coated by brush or swab. Care shall be exercised in spray application to avoid the deposition of dry particles on the surface. A wet spray shall be maintained at all times by additional thinning with Normal Butanol ASTM D 304. The acid component (diluent), over and above the amount prescribed above, shall not be used for thinning purposes. Surfaces shall receive the first coat of paint after at least 1 but not more than 24 hours drying of the pretreatment primer film.

3.1.5 Concrete Surfaces

New concrete surfaces, including concrete floors, shall be permitted to age for a minimum of 30 days prior to painting. Grease and oil removal shall be accomplished by solvent cleaning and/or detergent washing followed by rinsing. Loosely adherent materials such as dirt, dust, laitance, efflorescence, bleed water residues, or other foreign substances shall be removed by wire or fiber brushing, scrapers, light sandblasting, or other approved means. For interior walls and floors, sandblasting, unless otherwise specifically authorized, shall be restricted to the wet or vacuum type. Surface glaze, if present, shall be removed by light blasting or by scrubbing with a 5-percent solution of phosphoric acid. The texture of the surface after etching shall be roughly equivalent to the texture of an 80-120 grit sandpaper. If acid etching is used, the surface shall be thoroughly rinsed with clean water to remove all traces of the acid. Prior to painting, the concrete shall be dry. Adequate dryness shall be determined visually at the time of application by performing the following test. Tape 2-foot by 2-foot squares of polyethylene to the surface at random locations. The test patches shall remain in place overnight. Coatings may be applied if there are no traces of moisture and surfaces are dry beneath the polyethylene the following day.

3.2 PAINT APPLICATION

3.2.1 General

The finished coating shall be free from holidays, pinholes, bubbles, runs, drops, ridges, waves, laps, excessive or unsightly brush marks, and variations in color, texture, and gloss. Application of initial or subsequent coatings shall not commence until the Contracting Officer has verified that atmospheric conditions and the surfaces to be coated are satisfactory. Each paint coat shall be applied in a manner that will produce an even, continuous film of uniform thickness. Edges, corners, crevices, seams, joints, welds, rivets, corrosion pits, and other surface irregularities shall receive special attention to ensure that they receive an adequate thickness of paint. Spray equipment shall be equipped with traps and separators and where appropriate, mechanical agitators, pressure gauges, pressure regulators, and screens or filters. Air caps, nozzles, and needles shall be as recommended by the spray equipment manufacturer for the material being applied. Airless-type spray equipment may be used only on broad, flat, or otherwise simply configured surfaces, except that it may be employed for general painting if the spray gun is equipped with dual or adjustable tips of proper types and orifice sizes. Airless-type equipment

shall not be used for the application of vinyl paints.

3.2.2 Mixing and Thinning

Paints shall be thoroughly mixed, strained where necessary, and kept at a uniform composition and consistency during application. Paste or dry-powder pigments specified to be added at the time of use shall, with the aid of powered stirrers, be incorporated into the vehicle or base paint in a manner that will produce a smooth, homogeneous mixture free of lumps and dry particles. Where necessary to suit conditions of the surface temperature, weather, and method of application, the paint may be thinned immediately prior to use. Thinning shall generally be limited to the addition of not more than 1 pint per gallon of the proper thinner; this general limitation shall not apply when more specific thinning instructions are provided. Paint that has been stored at low temperature, shall be brought up to at least 70 degrees F before being mixed and thinned, and its temperature in the spray tank or other working container shall not fall below 60 degrees F during the application. Paint that has deteriorated in any manner to a degree that it cannot be restored to essentially its original condition by customary field-mixing methods shall not be used and shall be removed from the project site. Paint and thinner that is more than 1 year old shall be resampled and resubmitted for testing to determine its suitability for application.

3.2.3 Atmospheric and Surface Conditions

Paint shall be applied only to surfaces that are above the dew point temperature and that are completely free of moisture as determined by sight and touch. Paint shall not be applied to surfaces upon which there is detectable frost or ice. Except as otherwise specified, the temperature of the surfaces to be painted and of air in contact therewith shall be not less than 45 degrees F during paint application nor shall paint be applied if the surfaces can be expected to drop to 32 degrees F or lower before the film has dried to a reasonably firm condition. During periods of inclement weather, painting may be continued by enclosing the surfaces and applying artificial heat, provided the minimum temperatures and surface dryness requirements prescribed previously are maintained. Paint shall not be applied to surfaces heated by direct sunlight or other sources to temperatures that will cause detrimental blistering, pinholing, or porosity of the film.

3.2.4 Time Between Surface Preparation and Painting

Surfaces that have been cleaned and/or otherwise prepared for painting shall be primed as soon as practicable after such preparation has been completed but, in any event, prior to any deterioration of the prepared surface.

3.2.5 Method of Paint Application

Unless otherwise specified, paint shall be applied by brush or spray to ferrous and nonferrous metal surfaces. Special attention shall be directed toward ensuring adequate coverage of edges, corners, crevices, pits, rivets, bolts, welds, and similar surface irregularities. Other methods of

application to metal surfaces shall be subject to the specific approval of the Contracting Officer. Paint on plaster, concrete, or other nonmetallic surfaces shall be applied by brush, roller, and/or spray.

3.2.6 Coverage and Film Thickness

Film thickness or spreading rates shall be as specified hereinafter. Where no spreading rate is specified, the paint shall be applied at a rate normal for the type of material being used. In any event, the combined coats of a specified paint system shall completely hide base surface and the finish coats shall completely hide undercoats of dissimilar color.

3.2.6.1 Measurement on Ferrous Metal

Where dry film thickness requirements are specified for coatings on ferrous surfaces, measurements shall be made with one of the thickness gages listed below. They shall be calibrated and used in accordance with ASTM D 1186. They shall be calibrated using plastic shims with metal practically identical in composition and surface preparation to that being coated, and of substantially the same thickness (except that for measurements on metal thicker than 1/4 inch, the instrument may be calibrated on metal with a minimum thickness of 1/4 inch). Frequency of measurements shall be as recommended for field measurements by ASTM D 1186 and reported as the mean for each spot determination. The instruments shall be calibrated or calibration verified prior to, during, and after each use. Authorized thickness gages:

a. Mikrotest, Elektro-Physik, Inc.
b. Inspector Gage, Elcometer Instruments, Ltd.
c. Positest, Defelsko Corporation
d. Minitector, Elcometer Instruments, Ltd.
e. Positector 2000, Defelsko Corporation

3.2.6.2 Measurements on Nonferrous Metal

Where dry film thickness requirements are specified for coatings applied to nonferrous metal surfaces, measurements shall be made with one of the thickness gages listed. They shall be calibrated and used in accordance with ASTM D 1400. Calibration shall be on metal identical in composition and surface preparation to that being coated and of substantially the same thickness (except that for measurements on metal thicker than 1/4 inch, the instrument may be calibrated on metal with a minimum thickness of 1/4 inch). Frequency of measurements shall be as recommended for field measurements by ASTM D 1400 and reported as the mean for each spot determination. The instruments shall be calibrated or calibration verified prior to, during, and after each use. Authorized thickness gages:

a. Positector 3000 (aluminum and copper only)

b. Defelsko Corporation Minitector Model 250N, 150N, or 150FN, Elcometer Instruments, Ltd.

3.2.7 Progress of Painting Work

Where field painting on any type of surface has commenced, the complete painting operation, including priming and finishing coats, on that portion of the work shall be completed as soon as practicable, without prolonged delays. Sufficient time shall elapse between successive coats to permit them to dry properly for recoating, and this period shall be modified as necessary to suit adverse weather conditions. Paint shall be considered dry for recoating when it feels firm, does not deform or feel sticky under moderate pressure of the finger, and the application of another coat of paint does not cause film irregularities such as lifting or loss of adhesion of the undercoat. All coats of all painted surfaces shall be unscarred and completely integral at the time of application of succeeding coats. At the time of application of each successive coat, undercoats shall be cleaned of dust, grease, overspray, or foreign matter by means of airblast, solvent cleaning, or other suitable means. Cement and mortar deposits on painted steel surfaces, not satisfactorily removed by ordinary cleaning methods, shall be brushoff blast cleaned and completely repainted as required. Undercoats of high gloss shall, if necessary for establishment of good adhesion, be scuff sanded, solvent wiped, or otherwise treated prior to application of a succeeding coat. Field coats on metal shall be applied after erection except as otherwise specified and except for surfaces to be painted that will become inaccessible after erection.

3.2.8 Contacting Surfaces

When riveted or ordinary bolted contact is to exist between surfaces of ferrous or other metal parts of substantially similar chemical composition, such surfaces will not be required to be painted, but any resulting crevices shall subsequently be filled or sealed with paint. Contacting metal surfaces formed by high-strength bolts in friction-type connections shall not be painted. Where a nonmetal surface is to be in riveted or bolted contact with a metal surface, the contacting surfaces of the metal shall be cleaned and given three coats of the specified primer. Unless otherwise specified, corrosion-resisting metal surfaces, including cladding therewith, shall not be painted.

3.2.9 Drying Time Prior to Immersion

Minimum drying periods after final coat prior to immersion shall be: epoxy systems at least 5 days, vinyl-type paint systems at least 3 days, and cold-applied coal tar systems at least 7 days. Minimum drying periods shall be increased twofold if the drying temperature is below 65 degrees F and/or if the immersion exposure involves considerable abrasion.

3.2.10 Protection of Painted Surfaces

Where shelter and/or heat are provided for painted surfaces during inclement weather, such protective measures shall be maintained until the paint film has dried and discontinuance of the measures is authorized. Items that have been painted shall not be handled, worked on, or otherwise disturbed until the paint coat is fully dry and hard. All metalwork coated in the shop or field prior to final erection shall be stored out of contact

with the ground in a manner and location that will minimize the formation of water-holding pockets; soiling, contamination, and deterioration of the paint film, and damaged areas of paint on such metalwork shall be cleaned and touched up without delay. The first field coat of paint shall be applied within a reasonable period of time after the shop coat and in any event before weathering of the shop coat becomes extensive.

3.2.11 Vinyl Paints

3.2.11.1 General

Vinyl paints shall be spray applied, except that areas inaccessible to spraying shall be brushed. All of the vinyl paints require thinning for spray application except the zinc-rich vinyl paint (Formula VZ 108d) which will normally require thinning only under certain weather conditions. Thinners for vinyl paints shall be as follows:

APPROXIMATE AMBIENT AIR TEMPERATURE (Degree F)	
Below 50	MEK
50 - 70	MIBK
Above 70	MIAK

The amount of thinner shall be varied to provide a wet spray and avoid deposition of particles that are semidry when they strike the surface. Vinyl paints shall not be applied when the temperature of the ambient air receiving surfaces is less than 35 degrees F nor when the receiving surfaces are higher than 125 degrees F. Each spray coat of vinyl paint shall consist of a preliminary extra spray pass on edges, corners, interior angles, pits, seams, crevices, junctions of joining members, rivets, weld lines, and similar surface irregularities followed by an overall double spray coat. A double spray coat of vinyl-type paint shall consist of applying paint to a working area of not less than several hundred square feet in a single, half-lapped pass, followed after drying to at least a near tack-free condition by another spray pass applied at the same coverage rate and where practicable at right angles to the first. Rivets, bolts, and similar surface projections shall receive sprayed paint from every direction to ensure complete coverage of all faces. Pits, cracks, and crevices shall be filled with paint insofar as practicable, but in any event, all pit surfaces shall be thoroughly covered and all cracks and crevices shall be sealed off against the entrance of moisture. Fluid and atomization pressures shall be kept as low as practicable consistent with good spraying results. Unless otherwise specified, not more than 2.0 mils, average dry film thickness, of vinyl paint shall be applied per double spray coat. Except where otherwise indicated, an undercoat of the vinyl-type paint may receive the next coat any time after the undercoat is tack-free and firm to the touch, provided that no speedup or delay in the recoating schedule shall cause film defects such as sags, runs, air bubbles, air craters, or poor intercoat adhesion. Neither the prime coat nor any other coat shall be walked upon or be subjected to any other abrading action until it has hardened sufficiently to resist mechanical damage.

3.2.11.2 Vinyl Zinc-Rich Primer

Primer shall be field mixed combining components A, B, and C. Mixing shall be in accordance with label instructions. After mixing, the paint shall be kept covered at all times to avoid contamination and shall be applied within 8 days after it is mixed. When the ambient and/or steel temperature is below about 80 degrees F, the paint will not normally require thinning; however, the paint shall at all times contain sufficient volatiles (thinners) to permit it to be satisfactorily atomized and to provide a wet spray and to avoid deposition of particles that are semidry when they reach the surface. The paint shall be stirred continuously during application at a rate that will prevent the zinc dust from settling. When spraying is resumed after any interruption of longer than 15 minutes, the entire length of the material hose shall be whipped vigorously until any settled zinc is redispersed. Long periods of permitting the paint to remain stagnant in the hose shall be avoided by emptying the hoses whenever the painting operation is to be suspended for more than 1 hour. The material (paint) hoses shall be kept as short as practicable, preferably not more than 50 feet in length. Equipment used for spraying this zinc primer shall not be used for spraying other vinyl-type paints without first being thoroughly cleaned, since many of the other paints will not tolerate zinc contamination; no type of hot spray shall be used. An average dry film thickness of up to 2.5 mils may be applied in one double-spray coat. Unless specifically authorized, not more than 8 days shall elapse after application of a VZ-108d zinc-rich coat before it receives a succeeding coat.

3.2.11.3 Vinyl Paints

Vinyl Paints (Formulas V-102e, V-103c, V-106d, and V-766e) are ready-mixed paints designed to be spray applied over a wide range of ambient temperatures by field thinning with the proper type and amount of thinner. For spray application, they shall be thinned as necessary up to approximately 25 percent (1 quart per gallon of base paint) with the appropriate thinner; when ambient and steel temperatures are above normal, up to 40-percent thinning may be necessary for satisfactory application.

3.3 PAINT SYSTEMS APPLICATION

The required paint systems and the surfaces to which they shall be applied are shown in this paragraph, and/or in the drawings. Supplementary information follows.

3.3.1 Fabricated and Assembled Items

Items that have been fabricated and/or assembled into essentially their final form and that are customarily cleaned and painted in accordance with the manufacturer's standard practice will be exempted from equivalent surface preparation and painting requirements described herein, provided that:

a. Surfaces primed (only) in accordance with such standard practices are compatible with specified field-applied finish coats.

b. Surfaces that have been primed and finish painted in accordance with the manufacturer's standard practice are of acceptable color and are capable of being satisfactorily touched up in the field.

c. Items expressly designated herein to be cleaned and painted in a specified manner are not coated in accordance with the manufacturer's standard practice if different from that specified herein.

3.3.2 Surface Preparation

The method of surface preparation and pretreatment shown in the tabulation of paint systems is for identification purposes only. Cleaning and pretreatment of surfaces prior to painting shall be accomplished in accordance with detailed requirements previously described.

3.3.3 System No. 2

The first coat shall be brush or spray applied in the shop or field as indicated at a maximum spreading rate of 600 square feet per gallon and touched up in the field as necessary to maintain its integrity at all times. The second or third coats of the system shall be applied in the field at a maximum spreading rate of 450 square feet per gallon. Prior to applying field coats, all field welds, other bare metal, and damaged areas of the shop-primed surfaces shall be cleaned and primed as previously specified except that application shall be by brush.

3.3.4 System No. 4

Paint shall be spray applied to an average minimum dry film thickness of 7.5 mils for the completed system, and the thickness at any point shall not be less than 6.0 mils. The specified total film thickness shall be attained in any event, and additional coats needed to attain the specified thickness shall be applied at no additional cost to the Government. Attaining the specified film thickness in fewer than the prescribed number of coats or spray passes will be acceptable provided heavier applications do not cause an increase in pinholes, bubbles, blisters, or voids in the dried film and also provided that no more than 2.0 mils (dry film thickness) per double spray coat nor more than 1.0 mil per single spray pass of nonzinc paint shall be applied at one time.

3.3.5 Protection of Nonpainted Items and Cleanup

Walls, equipment, fixtures and all other items in the vicinity of the surfaces being painted shall be maintained free from damage by paint or painting activities. Paint spillage and painting activity damage shall be promptly repaired.

3.3.6 ANTI-GRAFFITI PAINT SYSTEM

Provide paint, to include initial surface preparation, at the outlet headwall. Surface preparation shall consist of power washing the concrete in accordance with ASTM D 4258. Painting shall be the Anti-Graffiti System, to include a pre-prime coat, followed by a high solids coat, followed by a urethane top coat. Paint to be applied in accordance with

manufacturer's recommendations, to include mandatory backrolling of the high solids coat and backrolling of the urethane top coat, as necessary, to eliminate pinholes. A manufacturer's technical representative must oversee the coating operation, including the surface preparation and coating application phases. Provide a minimum 10-year manufacturer's warranty that shall be submitted, in writing, upon completion of coating operations. Warranty to include a statement certifying that the Anti-Graffiti Paint System was applied in accordance with the manufacturer's recommendations.

3.4 PAINTING SCHEDULES

SYSTEM NO. 2

Items or surfaces to be coated: All ferrous surfaces exposed to atmospheric conditions

SURFACE PREPARATION	1st COAT	2nd COAT	3rd COAT
Power tool or brushoff blast cleaning	SSPC Paint 25 Type I	FS TT-P-38 (Aluminum)	FS TT-P-38 (Aluminum)

SYSTEM NO. 4

Items or surfaces to be coated: Items or surfaces to be coated: Flap gate, gate frame, and all ferrous surfaces not exposed to atmospheric conditions that are not galvanized

SURFACE PREPARATION	1st COAT	2nd COAT	3rd COAT	4th COAT	5th COAT
White metal blast clean	White Vinyl V-766e (double spray coat)	Gray Vinyl V-766e (double spray coat)	White Vinyl V-766e (double spray coat)	Gray Vinyl V-766e (double spray coat)	Gray Vinyl V-766e (double spray coat)

ANTI-GRAFFITI SYSTEM

Items or surfaces to be coated: Outlet headwall

SURFACE PREPARATION	1st COAT	2nd COAT	3rd COAT
ASTM D 4258 Powerwash	Chelated Polymeric Oxirane or Epoxy-Amine	Catalyzed Polyamide Epoxy	Aliphatic Acrylic Polyurethane

-- End of Section --