DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

Contracts Branch
Contracting Division

SUBJECT: Central Contractor Registration

TO ALL PROSPECTIVE CONTRACTORS:

Please be advised that it is now required to register with the CCR (Central Contractor Registration) in order to perform work for the Federal Government. For additional information, please refer to the instruction sheet on the back of this letter, which includes the appropriate websites and telephone numbers.

Sincerely,

Ella D. Snell
Contracting Officer

CENTRAL CONTRACTOR REGISTRATION

HTTP://WWW.ACQ.OSD.MIL/EC

1(800) 334-3414

The Central Contractor Registry (CCR) is the Government's new national storing house of commercial and financial information on current and would-be contractors.

CCR eliminates the requirement for current and future contractors to submit Standard Form 129 and provides a single location for registering to conduct business with the Federal Government. Access to the register is available via the World Wide Web. A registration workbook is available for downloading from this site. It is highly recommended you review it prior to processing CCR to ensure all required information is available. Contractors are required to have a DUNS (Data Universal Numbering System) assigned by Dunn & Bradstreet at no charge (call 1-800-333-0505).

The initial Web Site application capability is for the initial contractor registration only. The ability to change, update or cancel a registration and query contractor information via the Web is currently in effect. After submitting a registration, contractors may use the Web application to inquire as to the status of their registration. Typically, a registration will be activated within 48 hours after receiving a complete and accurate application via the Internet. To register via the Internet, go to *http://ccr.edi.disa.mil*. Registration of an applicant through fax or mail may take up to 30 days. The mailing addresses are as follows: For firms with Legal business names beginning with the letters A-K or a number use CCR Registration Assistance Center, 2000 South Loop 256, Suite 11, Palestine, Texas 75801, FAX NO: (903) 729-7988. For firms with Legal business names beginning with the letters L-Z or a number use CCR Registration Assistance Center, 1450 Scalp Avenue, Johnstown, PA. 15904 FAX NO: (814) 262-2326. For those Contractor's who chose to register by mail, a paper registration form can be used and sent or faxed to the appropriate above address who will also furnish the form. Once successfully registered in CCR, a notice will be sent via email, fax, or regular post with information that a Trading Partner Identification Number (TPIN) will soon follow. For CCR implementation and contract questions please contact Robert Cooper at (703) 681-7573.

Anyone may access CCR via the Web to inquire whether vendor is registered at the following site: *http://ccr.edi.disa.mil.*

Information or assistance is available from your local Electronic Commerce Resources Center or Electronic Commerce Information Center at 1-800-334-3414 (8am-8pm), Monday-Friday, except Federal Holidays.

Additionally, your local Procurement Technical Assistance Center (PTAC) employs highly skilled professionals to help businesses like ours earn Federal and State Government contracts; assist with your CCR enrollment. The PTAC can provide Government specifications, daily listings of bid opportunities, bid history and contract award results, training and assistance with Electronic Data Exchange (EDI).

To find the office nearest you, the national PTAC directory can be accessed at Website *http://www.fedmarket.com/tecassis.html.*

US Army Corps
of Engineers®
NEW YORK DISTRICT

JOSEPH G. MINISH
PASSAIC RIVER WATERFRONT PARK AND HISTORIC AREA

NEWARK, NEW JERSEY

CONSTRUCTION CONTRACT NO. 4

STATION 37+10 TO STATION 92+13.59

Specifications

W912DS-04-B-0015

US ARMY ENGINEER DISTRICT, NEW YORK

INVITATION FOR BIDS NO.

CHECK LIST FOR BIDDERS

ATTACHED IS IFB NO.

JOSEPH G. MINISH PASSAIC RIVER WATERFRONT PARK AND HISTORIC AREA, NEWARK, NEW JERSEY
CONSTRUCTION CONTRACT NO. 4
STATION 37+10 TO STATION 92+13.59

ALL INFORMATION REQUIRED BY THE TERMS OF THIS SOLICITATION MUST BE FURNISHED. MISTAKES OR OMISSIONS MAY RENDER YOUR OFFER INELIGIBLE FOR AWARD. IMPORTANT ITEMS FOR YOU TO CHECK ARE INCLUDED IN BUT NOT LIMITED TO THOSE LISTED BELOW. THIS INFORMATION IS FURNISHED ONLY TO ASSIST YOU IN SUBMITTING A PROPER BID

__HAVE YOU ACKNOWLEDGED ALL AMENDMENTS?

__HAVE YOU COMPLETED THE "REPRESENTATIONS AND CERTIFICATIONS" (SECTION 00600) PORTION OF THE SOLICITATION?

__IS YOUR DUNS NUMBER LISTED ON THE STANDARD FORM 1442?

__IS YOUR BID PROPERLY SIGNED?

__IS YOUR BID GUARANTEE PROPERLY SIGNED BY BOTH THE BIDDER AND SURETY AND ARE ALL SEALS AFFIXED?

__DO THE BID BOND AND ACCOMPANYING DOCUMENTS BEAR SIGNATURES AND SEALS AFFIXED **AFTER** THE DOCUMENT WAS GENERATED, AS OPPOSED TO COMPUTER PRINTER-GENERATED SIGNATURES AND/OR SEALS?

__HAVE YOU ENSURED THAT YOU HAVE NOT RESTRICTED YOUR OFFER BY ALTERING THE PROVISIONS OF THE SOLICITATION?

__WHEN REQUIRED, HAVE YOU ENTERED A UNIT PRICE FOR EACH PRICE ITEM? (THE SOLICITATION SPECIFICALLY STATES WHEN THIS IS NECESSARY.)

__ARE DECIMALS IN YOUR PRICES IN THE PROPER PLACE? ARE YOUR

FIGURES LEGIBLE?

__IF YOU HAVE MADE ERASURES OR CORRECTIONS ON YOUR BID, ARE THEY INITIALED BY THE PERSON SIGNING THE BID?

__DOES THE ENVELOPE CONTAINING YOUR BID PROPERLY IDENTIFY THAT IT ISA SEALED BID AND DOES IT CONTAIN THE CORRECT SOLICITATION NUMBER AND BID OPENING TIME?

__WILL YOUR OFFER ARRIVE ON TIME? (SEE PARAGRAPH ENTITLED "LATE SUBMISSIONS, MODIFICATIONS, AND WITHDRAWALS OF BIDS" IN THE INSTRUCTIONS, CONDITIONS, AND NOTICES TO BIDDERS, SECTION 00100 OF THE SOLICITATION.)

NOTE: THERE ARE INCREASED SECURITY MEASURES AT JACOB K. JAVITS FEDERAL BUILDING, 26 FEDERAL PLAZA THAT MAY AFFECT THE TIME IT TAKES TO ENTER THE BUILDING. BIDDERS IS RESPONSIBLE TO ENSURE THAT ITS BID IS SUBMITTED TIMELY.

NEW YORK DISTRICT
CORPS OF ENGINEERS
NEW YORK, NEW YORK 10278-0090

INVITATION FOR BIDS
FOR
JOSEPH G. MINISH PASSAIC RIVER WATERFRONT PARK
AND HISTORIC AREA, NEWARK, NEW JERSEY
CONSTRUCTION CONTRACT NO. 4
STATION 37+10 TO STATION 92+13.59

1. Attached is INVITATION FOR BIDS (IFB) NO.

2. BIDS MUST BE SET FORTH full, accurate, and complete information as required by this Invitation for Bids, including attachments. The penalty for making false statements in bids is prescribed under Title 18, United States Code, Section 1001.

3. SUBMISSION OF BIDS: Complete details concerning proper submission of bids are contained in the INSTRUCTIONS, CONDITIONS, AND NOTICES TO BIDDERS (Section 00100).

4. Note the REQUIREMENT FOR AFFIRMATIVE ACTION of the EQUAL OPPORTUNITY clause as it applies to the contract resulting from this solicitation. (See paragraph NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY in Section 00100 of this IFB).

5. REPRESENTATIONS AND CERTIFICATIONS – SECTION 00600 Bidders and Offerors are required to complete the REPRESENTATIONS AND CERTIFICATIONS and submit them with their bids.

   Within Section 00600, note in particular the PROHIBITION OF SEGREGATED FACILITIES. Failure of a bidder or offeror to agree to the certification will render his bid or offer non-responsive to the terms of solicitations involving awards of contracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause (1984 APR).

6. THIS PROJECT IS A CIVIL WORKS PROGRAM PROCUREMENT AND IS NOT FUNDED BY THE DEPARTMENT OF DEFENSE. BUY AMERICAN ACT – CONSTRUCTION MATERIALS (MAY 1993) IN ACCORDANCE WITH FAR 52.225-5 APPLIES.

7. Please review all bonds and accompanying documents required to be submitted. Bonds, Powers of Attorney, statements of authenticity and continuing validity, and all related documents **MUST NOT** bear computer printer-generated signatures and/or seals. Documents bearing signatures and/or seals generated as part of a document, as opposed to being affixed to the document **after** its generation, will not be accepted. Submission of such documents may render the bid or offer non-responsive and ineligible for award.

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SECTION	TITLE
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00100	INSTRUCTIONS TO BIDDERS
00600	REPRESENTATIONS AND CERTIFICATIONS
00700	CONTRACT CLAUSES
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01312	QUALITY CONTROL SYSTEM (QCS)

01330	SUBMITTAL PROCEDURES
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SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO. W912DS-04-B-0015	2. TYPE OF SOLICITATION [X] SEALED BID (IFB) [ ] NEGOTIATED *(RFP)*	3. DATE ISSUED 05-Aug-2004	PAGE OF PAGES 1 OF 67

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO. W16ROE-4085-7150	6. PROJECT NO.

7. ISSUED BY CODE W912DS	8. ADDRESS OFFER TO *(If Other Than Item 7)* CODE
USA ENGINEER DISTRICT, NEW YORK ATTN:CENAN-CT ROOM 1843 26 FEDERAL PLAZA NEW YORK NY 10278	**See Item 7**
TEL:212-264-0238 FAX: 212-264-3013	TEL: FAX:

9. FOR INFORMATION CALL:	A. NAME EDWARD T LEW	B. TELEPHONE NO. *(Include area code)* *(NO COLLECT CALLS)* 212-264-7740

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying no., date):*

JOSEPH G. MINISH PASSAIC RIVER WATERFRONT PARK AND HISTORIC AREA, NEWARK, NEW JERSEY, STATION 37+10 TO STATION 92+13.59 *****CONSTRUCTION CONTRACT #4*****

THIS REQUIREMENT IS PURSUANT TO FAR SUBPART 19.10 -- SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM

This procurement is being solicited as UNRESTRICTED REQUIREMENT. The applicable NAICS Code is 237990 with a small business size standard of $28.5 million. The estimated cost for this project is $10,000,000.00 TO $15,000,00.00.

11. The Contractor shall begin performance within 5 calendar days and complete it within 548 calendar days after receiving [ ] award, [X] notice to proceed. This performance period is [X] mandatory, [ ] negotiable. *(See _____ .)*

12 A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES," indicate within how many calendar days after award in Item 12B.)* [X] YES [ ] NO	12B. CALENDAR DAYS 10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 2 copies to perform the work required are due at the place specified in Item 8 by 11:00 AM *(hour)* local time 07 Sep 2004 *(date).* If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee [X] is, [ ] is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

SOLICITATION, OFFER, AND AWARD (Continued)

(Construction, Alteration, or Repair)

OFFER ***(Must be fully completed by offeror)***

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*		15. TELEPHONE NO. *(Include area code)*
		16. REMITTANCE ADDRESS *(Include only if different than Item 14)* **See Item 14**
CODE	FACILITY CODE	

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. *(Insert any number equal to or greater than the minimum requirements stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)*

AMOUNTS	SEE SCHEDULE OF PRICES

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*	20B. SIGNATURE	20C. OFFER DATE

AWARD ***(To be completed by Government)***

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)*	**ITEM**	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C. 2304(c) ☐ 41 U.S.C. 253(c)
26. ADMINISTERED BY CODE		27. PAYMENT WILL BE MADE BY: CODE

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work, requisitions identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications or incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation, is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*		31A. NAME OF CONTRACTING OFFICER *(Type or print)* TEL: EMAIL:
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY
		31C. AWARD DATE

Section 00010 - Solicitation Contract Form

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Lump Sum		
	BULKHEAD CONSTRUCTION WORK FFP ALL CONSTRUCTION WORK ASSOCIATED WITH THE BULKHEAD, APPURTENANCES, AND WETLAND FOR STATIONS 52-24.70 THROUGH 86-25, COMPLETE, IAW THE ATTACHED PLANS AND SPECIFICATIONS. PURCHASE REQUEST NUMBER: W16ROE-4085-7150			
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		1	Lump Sum		
	RIVER EXCAVATION WORK FFP ALL WORK ASSOCIATED WITH THE EXCAVATION AND TREATMENT OF CONTAMINATED RIVER SEDIMENT MATERIAL FROM BELOW MEAN HIGH TIDE, FROM STATIONS 86+25 THROUGH 92+13.59, COMPLETE, IAW THE ATTACHED PLANS AND SPECIFICATIONS. PURCHASE REQUEST NUMBER: W16ROE-4085-7150			
			NET AMT		

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003		1	Lump Sum		
OPTION	OPTION #1 FFP ALL WORK ASSOCIATED WITH THE CONCRETE CAP AND DRAINAGE FOR STATIONS 45+71.33 THROUGH 52+24.70, COMPLETE, IAW ATTACHED PLANS AND SPECIFICATIONS, IF EXERCISED.				
			NET AMT		

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004 OPTION	OPTION #2 FFP WORK ASSOCIATED WITH STATIONS 37+10 THROUGH 45+71.33, IF EXERCISED.				
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004AA OPTION		1	Lump Sum		
	FFP ALL WORK ASSOCIATED WITH THE CONSTRUCTION OF BULKHEAD AND APPURTENANCES FOR STATIONS 37+10 THROUGH 45+71.33, COMPLETE, IAW ATTACHED PLANS AND SPECIFICATIONS, IF EXERCISED.				
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004AB OPTION		1	Lump Sum		
	FFP ALL WORK ASSOCIATED WITH THE CONSTRUCTION OF BULKHEAD AND APPURTENANCES FOR STATIONS 37+10 THROUGH 45+71.33, COMPLETE, IAW ATTACHED PLANS AND SPECIFICATIONS, IF EXERCISED.				
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005 OPTION	OPTION #3 FFP WORK ASSOCIATED WITH SHEETPILE FOR STATIONS 50+24.70 THROUGH 52+24.70, IF EXERCISED.				
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005AA		1	Lump Sum		

OPTION

FFP
SHEETPILE FOR STATION 50+24.70 THROUGH 50+24.70,
MATERIAL ONLY, IF EXERCISED.

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005AB		1	Lump Sum		

OPTION

FFP
SHEETPILE FOR STATION 50+24.70 THROUGH 50+24.70,
LABOR ONLY, IF EXERCISED.

NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0006 OPTION	OPTION #4 FFP WORK ASSOCIATED FOR STATIONS 86+25 THROUGH 92+13.59, IF EXERCISED.				
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0006AA OPTION		1	Lump Sum		
	FFP ALL WORK ASSOCIATED FOR STREAMBANK STABILIZATION, FROM STATIONS 86+25 THROUGH 92+13.59, COMPLETE, IAW ATTACHED PLANS AND SPECIFICATIONS, IF EXERCISED				
				NET AMT	

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0006AB OPTION	FFP EXCAVATION AND TREATMENT OF CONTAMINATED RIVER SEDIMENT MATERIAL FROM BELOW MEAN HIGH TIDE, FROM STATIONS 86+25 THROUGH 92+13.59, COMPLETE, IAW THE ATTACHED PLANS AND SPECIFICATIONS, IF EXERCISED.	1	Lump Sum		

_____

NET AMT

FOB: Destination

NOTES

TOTAL BASE BID: _____

TOTAL OPTION # ONE (1): _____

TOTAL OPTION # TWO (2): _____

TOTAL OPTION # THREE (3): _____

TOTAL OPTION # FOUR (4): _____

TOTAL BASE BID INCLUDING ALL OPTIONS: _____

Section 00100 - Bidding Schedule/Instructions to Bidders

CLAUSES INCORPORATED BY REFERENCE

52.214-3	Amendments To Invitations For Bids	DEC 1989
52.214-4	False Statements In Bids	APR 1984
52.214-5	Submission Of Bids	MAR 1997
52.214-6	Explanation To Prospective Bidders	APR 1984
52.214-7	Late Submissions, Modifications, and Withdrawals of Bids	NOV 1999
52.214-12	Preparation Of Bids	APR 1984
52.214-18	Preparation of Bids-Construction	APR 1984
52.214-19	Contract Award-Sealed Bidding-Construction	AUG 1996
52.214-21	Descriptive Literature	APR 2002
52.214-34	Submission Of Offers In The English Language	APR 1991
52.214-35	Submission Of Offers In U.S. Currency	APR 1991
52.225-12	Notice of Buy American Act Requirement - Construction Materials Under Trade Agreements	JAN 2004
52.232-33	Payment by Electronic Funds Transfer--Central Contractor Registration	OCT 2003
52.232-38	Submission of Electronic Funds Transfer Information with Offer	MAY 1999

CLAUSES INCORPORATED BY FULL TEXT

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a firm-fixed price contract resulting from this solicitation.

(End of clause)

52.217-5 EVALUATION OF OPTIONS (JUL 1990)

Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).

(End of provision)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
17.3%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is [Contracting Officer shall insert description of the geographical areas where the contract is to be performed, giving the State, county, and city].

(End of provision)

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from _David H. Freedman, USA, MAJ, 26 Federal Plaza, RM 1843, New York, NY 10278-0090.

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://farsite.hill.af.mil/

(End of provision

52.252-3 ALTERATIONS IN SOLICITATION (APR 1984)

Portions of this solicitation are altered as follows:

52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (APR 1984)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of"(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

Section 00600 - Representations & Certifications

CLAUSES INCORPORATED BY REFERENCE

52.203-11	Certification And Disclosure Regarding Payments To Influence Certain Federal Transactions	APR 1991
52.222-38	Compliance With Veterans' Employment Reporting Requirements	DEC 2001
252.209-7001	Disclosure of Ownership or Control by the Government of a Terrorist Country	MAR 1998
252.225-7031	Secondary Arab Boycott Of Israel	APR 2003

CLAUSES INCORPORATED BY FULL TEXT

52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985)

(a) The offeror certifies that --

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to –

(i) Those prices,

(ii) The intention to submit an offer, or

(iii) The methods of factors used to calculate the prices offered:

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory --

(1) Is the person in the offeror's organization responsible for determining the prices offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision _____ (insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies subparagraph (a)(2) of this provision, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

(End of clause)

52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

“Common parent,” as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

“Taxpayer Identification Number (TIN),” as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) Taxpayer Identification Number (TIN).

___ TIN:._____

___ TIN has been applied for.

___ TIN is not required because:

___ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

___ Offeror is an agency or instrumentality of a foreign government;

___ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

___ Sole proprietorship;

___ Partnership;

___ Corporate entity (not tax-exempt);

___ Corporate entity (tax-exempt);

___ Government entity (Federal, State, or local);

___ Foreign government;

___ International organization per 26 CFR 1.6049-4;

___ Other _____

(f) Common parent.

___ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

___ Name and TIN of common parent:

Name _____

TIN _____

(End of provision)

52.204-5 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (MAY 1999)

(a) Definition. Women-owned business concern, as used in this provision, means a concern that is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

(b) Representation. [Complete only if the offeror is a women-owned business concern and has not represented itself as a small business concern in paragraph (b)(1) of FAR 52.219-1, Small Business Program Representations, of this solicitation.] The offeror represents that it ( ) is a women-owned business concern.

(End of provision)

52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (DEC 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that-

(i) The Offeror and/or any of its Principals-

(A) Are ( ) are not ( ) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ( ) have not ( ), within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are ( ) are not ( ) presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (a)(1)(i)(B) of this provision.

(ii) The Offeror has ( ) has not ( ), within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity

(e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

This Certification Concerns a Matter Within the Jurisdiction of an Agency of the United States and the Making of a False, Fictitious, or Fraudulent Certification May Render the Maker Subject to Prosecution Under Section 1001, Title 18, United States Code.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of provision)

52.214-14 PLACE OF PERFORMANCE--SEALED BIDDING (APR 1985)

(a) The bidder, in the performance of any contract resulting from this solicitation, [ ] intends, [ ] does not intend [check applicable box] to use one or more plants or facilities located at a different address from the address of the bidder as indicated in this bid.

(b) If the bidder checks "intends" in paragraph (a) above, it shall insert in the spaces provided below the required information:

Place of Performance (Street, Address, City, County, State, Zip Code)	Name and Address of Owner and Operator of the Plant or Facility if Other than Bidder

_____ _____
_____ _____
_____ _____

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (MAY 2004)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is (237990) (insert NAICS code).

(2) The small business size standard is ($28.5 Million) (insert size standard).

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a women-owned small business concern.

(4) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture:_____.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern," means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern," means a small business concern --

(1) That is at least 51 percent owned by one or more women; in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.219-2 EQUAL LOW BIDS. (OCT 1995)

(a) This provision applies to small business concerns only.

(b) The bidder's status as a labor surplus area (LSA) concern may affect entitlement to award in case of tie bids. If the bidder wishes to be considered for this priority, the bidder must identify, in the following space, the LSA in which the costs to be incurred on account of manufacturing or production (by the bidder or the first-tier subcontractors) amount to more than 50 percent of the contract price.

_____

_____

(c) Failure to identify the labor surplus area as specified in paragraph (b) of this provision will preclude the bidder from receiving priority consideration. If the bidder is awarded a contract as a result of receiving priority consideration under this provision and would not have otherwise received award, the bidder shall perform the contract or cause the contract to be performed in accordance with the obligations of an LSA concern.

52.219-22 SMALL DISADVANTAGED BUSINESS STATUS (OCT 1999)

(a) General. This provision is used to assess an offeror's small disadvantaged business status for the purpose of obtaining a benefit on this solicitation. Status as a small business and status as a small disadvantaged business for general statistical purposes is covered by the provision at FAR 52.219-1, Small Business Program Representation.

(b) Representations.

(1) General. The offeror represents, as part of its offer, that it is a small business under the size standard applicable to this acquisition; and either--

___ (i) It has received certification by the Small Business Administration as a small disadvantaged business concern consistent with 13 CFR 124, Subpart B; and

(A) No material change in disadvantaged ownership and control has occurred since its certification;

(B) Where the concern is owned by one or more disadvantaged individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(C) It is identified, on the date of this representation, as a certified small disadvantaged business concern in the database maintained by the Small Business Administration(PRO0Net); or

___ (ii) It has submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted.

(2)___ For Joint Ventures. The offeror represents, as part of its offer, that it is a joint venture that complies with the requirements at 13 CFR 124.1002(f) and that the representation in paragraph (b)(1) of this provision is accurate for the small disadvantaged business concern that is participating in the joint venture. [The offeror shall enter the name of the small disadvantaged business concern that is participating in the joint venture: _____.]

(c) Penalties and Remedies. Anyone who misrepresents any aspects of the disadvantaged status of a concern for the purposes of securing a contract or subcontract shall:

(1) Be punished by imposition of a fine, imprisonment, or both;

(2) Be subject to administrative remedies, including suspension and debarment; and

(3) Be ineligible for participation in programs conducted under the authority of the Small Business Act.

(End of provision)

52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that --

(a) ( ) It has, ( ) has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation;

(b) ( ) It has, ( ) has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (AUG 2003)

(a) Executive Order 13148, of April 21, 2000, Greening the Government through Leadership in Environmental Management, requires submission of this certification as a prerequisite for contract award.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: (Check each block that is applicable.)

( ) (i) The facility does not manufacture, process, or otherwise use any toxic chemicals listed in 40 CFR 372.65;

( ) (ii) The facility does not have 10 or more full-time employees as specified in section 313.(b)(1)(A) of EPCRA 42 U.S.C. 11023(b)(1)(A);

( ) (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

( ) (iv) The facility does not fall within the following Standard Industrial Classification (SIC) codes or their
corresponding North American Industry Classification System sectors:

(A) Major group code 10 (except 1011, 1081, and 1094.

(B) Major group code 12 (except 1241).

(C) Major group codes 20 through 39.

(D) Industry code 4911, 4931, or 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce).

(E) Industry code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C (42 U.S.C. 6921, et seq.), 5169, 5171, or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); or

( ) (v) The facility is not located within the United States or its outlying areas.

(End of clause)

52.226-2 HISTORICALLY BLACK COLLEGE OR UNIVERSITY AND MINORITY INSTITUTION REPRESENTATION (MAY 2001)

(a) Definitions. As used in this provision--

Historically black college or university means an institution determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. For the Department of Defense, the National Aeronautics and Space Administration, and the Coast Guard, the term also includes any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institution means an institution of higher education meeting the requirements of Section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1067k, including a Hispanic-serving institution of higher education, as defined in Section 316(b)(1) of the Act (20 U.S.C. 1101a)).

(b) Representation. The offeror represents that it--

( ) is ( ) is not a historically black college or university;

( ) is ( ) is not a minority institution.

(End of provision)

252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph (b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term supplies is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) Representation. The Offeror represents that it:

____ (1) Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

____ (2) Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

(End of provision)

Section 00700 - Contract Clauses

CLAUSES INCORPORATED BY REFERENCE

52.202-1 Alt I	Definitions (Jun 2004) --Alternate I	MAY 2001
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	JAN 1997
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	JUN 2003
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	JUL 1995
52.211-18	Variation in Estimated Quantity	APR 1984
52.214-26	Audit and Records--Sealed Bidding	OCT 1997
52.214-27	Price Reduction for Defective Cost or Pricing Data - Modifications - Sealed Bidding	OCT 1997
52.214-28	Subcontracting Cost Or Pricing Data--Modifications--Sealed Bidding	OCT 1997
52.214-29	Order Of Precedence--Sealed Bidding	JAN 1986
52.219-4	Notice of Price Evaluation Preference for HUBZone Small Business Concerns	JAN 1999
52.219-8	Utilization of Small Business Concerns	MAY 2004
52.219-9 Alt I	Small Business Subcontracting Plan (Jan 2002) Alternate I	OCT 2001
52.219-14	Limitations On Subcontracting	DEC 1996
52.219-16	Liquidated Damages-Subcontracting Plan	JAN 1999
52.222-1	Notice To The Government Of Labor Disputes	FEB 1997
52.222-3	Convict Labor	JUN 2003
52.222-4	Contract Work Hours and Safety Standards Act - Overtime Compensation	SEP 2000
52.222-6	Davis Bacon Act	FEB 1995
52.222-7	Withholding of Funds	FEB 1988
52.222-8	Payrolls and Basic Records	FEB 1988
52.222-9	Apprentices and Trainees	FEB 1988
52.222-10	Compliance with Copeland Act Requirements	FEB 1988
52.222-11	Subcontracts (Labor Standards)	FEB 1988
52.222-12	Contract Termination-Debarment	FEB 1988
52.222-13	Compliance with Davis-Bacon and Related Act Regulations.	FEB 1988

52.222-14	Disputes Concerning Labor Standards	FEB 1988
52.222-15	Certification of Eligibility	FEB 1988
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-26	Equal Opportunity	APR 2002
52.222-27	Affirmative Action Compliance Requirements for Construction	FEB 1999
52.222-35	Equal Opportunity For Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans	DEC 2001
52.222-36	Affirmative Action For Workers With Disabilities	JUN 1998
52.222-37	Employment Reports On Special Disabled Veterans, Veterans Of The Vietnam Era, and Other Eligible Veterans	DEC 2001
52.223-14	Toxic Chemical Release Reporting	AUG 2003
52.226-1	Utilization Of Indian Organizations And Indian-Owned Economic Enterprises	JUN 2000
52.227-1	Authorization and Consent	JUL 1995
52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	AUG 1996
52.227-4	Patent Indemnity-Construction Contracts	APR 1984
52.228-11	Pledges Of Assets	FEB 1992
52.228-14	Irrevocable Letter of Credit	DEC 1999
52.228-15	Performance and Payment Bonds--Construction	JUL 2000
52.229-3	Federal, State And Local Taxes	APR 2003
52.232-5	Payments under Fixed-Price Construction Contracts	SEP 2002
52.232-16	Progress Payments	APR 2003
52.232-23	Assignment Of Claims	JAN 1986
52.232-27	Prompt Payment for Construction Contracts	OCT 2003
52.233-1	Disputes	JUL 2002
52.233-3	Protest After Award	AUG 1996
52.236-5	Material and Workmanship	APR 1984
52.236-7	Permits and Responsibilities	NOV 1991
52.236-15	Schedules for Construction Contracts	APR 1984
52.236-17	Layout of Work	APR 1984
52.236-26	Preconstruction Conference	FEB 1995
52.242-13	Bankruptcy	JUL 1995
52.242-14	Suspension of Work	APR 1984
52.243-5	Changes and Changed Conditions	APR 1984
52.244-6	Subcontracts for Commercial Items	MAY 2004
52.246-1	Contractor Inspection Requirements	APR 1984
52.246-12	Inspection of Construction	AUG 1996
52.246-21	Warranty of Construction	MAR 1994
52.247-34	F.O.B. Destination	NOV 1991
52.249-2	Termination For Convenience Of The Government (Fixed-Price)	MAY 2004

52.249-2 Alt I	Termination for Convenience of the Government (Fixed-Price) (May 2004) - Alternate I	SEP 1996
52.253-1	Computer Generated Forms	JAN 1991
252.201-7000	Contracting Officer's Representative	DEC 1991
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	MAR 1999
252.203-7002	Display Of DOD Hotline Poster	DEC 1991
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004 Alt A	Required Central Contractor Registration Alternate A	NOV 2003
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.209-7000	Acquisition From Subcontractors Subject To On-Site Inspection Under The Intermediate Range Nuclear Forces (INF) Treaty	NOV 1995
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	MAR 1998
252.219-7003	Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan (DOD Contracts)	APR 1996
252.219-7011	Notification to Delay Performance	JUN 1998
252.225-7012	Preference For Certain Domestic Commodities	JUN 2004
252.225-7016	Restriction On Acquisition Of Ball and Roller Bearings	MAY 2004
252.232-7003	Electronic Submission of Payment Requests	JAN 2004
252.236-7000	Modification Proposals-Price Breakdown	DEC 1991
252.236-7001	Contract Drawings, Maps, and Specifications	AUG 2000
252.243-7001	Pricing Of Contract Modifications	DEC 1991
252.243-7002	Requests for Equitable Adjustment	MAR 1998
252.244-7000	Subcontracts for Commercial Items and Commercial Components (DoD Contracts)	MAR 2000
252.247-7023	Transportation of Supplies by Sea	MAY 2002
252.247-7024	Notification Of Transportation Of Supplies By Sea	MAR 2000

CLAUSES INCORPORATED BY FULL TEXT

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 5 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 548 calendar days after receipt of NTP. SEE SPECIFICATIONS SECTION 00800, PG. 3, PARA. 1. * The time

stated for completion shall include final cleanup of the premises.

*The Contracting Officer shall specify either a number of days after the date the contractor receives the notice to proceed, or a calendar date.

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of $ 630.00 for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

52.214-5000 APPARENT CLERICAL MISTAKES (MAR 1995)--EFARS

(a) For the purpose of initial evaluations of bids, the following will be utilized in the resolving arithmetic discrepancies found on the face of bidding schedule as submitted by the bidder:

(1) Obviously misplaced decimal points will be corrected;

(2) Discrepancy between unit price and extended price, the unit price will govern;

(3) Apparent errors in extension of unit prices will be corrected;

(4) Apparent errors in addition of lump-sum and extended prices will be corrected.

(b) For the purpose of bid evaluation, the government will proceed on the assumption that the bidder intends his bid to be evaluated on basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.

(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid is low.

(End of statement)

52.225-11 BUY AMERICAN ACT--CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (JUN 2004)

(a) Definitions. As used in this clause--

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the end product.

Designated country means any of the following countries: Aruba, Austria, Bangladesh, Belgium, Benin, Bhutan, Botswana, Burkina Faso, Burundi, Canada, Cape Verde, Central African Republic, Chad, Comoros, Cyprus, Czech Republic, Denmark. Djibouti, Equatorial Guinea, Estonia, Finland, France, Gambia, Germany, Greece, Guinea, Guinea-Bissau, Haiti, Hong Kong, Hungary, Ireland, Israel, Italy, Japan. Kiribati, Korea, Republic of, Lativia, Lesotho, Liechtenstein, Lithuania, Luxembourg, Malawi, Maldives, Mali, Malta, Mozambique, Nepal, Netherlands, Niger, Norway, Poland, Portugal, Rwanda. Sao Tome and Principe, Sierra Leone, Singapore, Slovak Republic, Slovenia, Somalia, Spain, Sweden, Switzerland, Tanzania U.R., Togo, Tuvalu, Uganda, United Kingdom, Vanuatu, Western Samoa, Yemen.

Designated country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different construction material distinct from the materials from which it was transformed.

Domestic construction material means--

(1) An unmanufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic.

Foreign construction material means a construction material other than a domestic construction material.

Free Trade Agreement country means Canada, Chile, Mexico, or Singapore.

Free Trade Agreement country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a Free Trade Agreement (FTA) country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a FTA country into a new and different construction material distinct from the materials from which it was transformed.

United States means the 50 States, the District of Columbia, and outlying areas.

(b) Construction materials. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) by providing a preference for domestic construction material. In addition, the Contracting Officer has determined that the Trade Agreements Act and Free Trade Agreements (FTAs) apply to this acquisition. Therefore, the Buy American Act restrictions are waived for designated country and FTA country construction materials.

(2) The Contractor shall use only domestic, designated country, or NAFTA country construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

(3) The requirement in paragraph (b)(2) of this clause does not apply to the construction materials or components listed by the Government as follows: (Contracting Officer to list applicable excepted materials or indicate “none”)

(4) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(3) of this clause if the Government determines that--

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the restrictions of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent;

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act.

(1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(4) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American Act applies, use of foreign construction material is noncompliant with the Buy American Act.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....
Item 2:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....

\1\ Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).
List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.
Include other applicable supporting information.

(e) United States law will apply to resolve any claim of breach of this contract.

(End of clause)

52.225-12 NOTICE OF BUY AMERICAN ACT REQUIREMENT-- CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (JAN 2004)

(a) Definitions. Construction material, designated country construction material, domestic construction material, foreign construction material, and FTA country construction material, as used in this provision, are defined in the clause of this solicitation entitled “Buy American Act -- Construction Materials under Trade Agreements” (Federal Acquisition Regulation (FAR) clause 52.225-11).

(b) Requests for determination of inapplicability. An offeror requesting a determination regarding the inapplicability of the Buy American Act should submit the request to the Contracting Officer in time to allow a determination before submission of offers. The offeror shall include the information and applicable supporting data required by paragraphs (c) and (d) of FAR clause 52.225-11 in the request. If an offeror has not requested a determination regarding the inapplicability of the Buy American Act before submitting its offer, or has not received a

response to a previous request, the offeror shall include the information and supporting data in the offer.

(c) Evaluation of offers. (1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act, based on claimed unreasonable cost of domestic construction materials, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(4)(i) of FAR clause 52.225-11.

(2) If evaluation results in a tie between an offeror that requested the substitution of foreign construction material based on unreasonable cost and an offeror that did not request an exception, the Contracting Officer will award to the offeror that did not request an exception based on unreasonable cost.

(d) Alternate offers. (1) When an offer includes foreign construction material, other than designated country or FTA country construction material, that is not listed by the Government in this solicitation in paragraph (b)(3) of FAR clause 52.225-11, the offeror also may submit an alternate offer based on use of equivalent domestic, designated country, or FTA country construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of FAR clause 52.225-11 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of FAR clause 52.225-11 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic, designated country, or FTA country construction material, and the offeror shall be required to furnish such domestic, designated country, or FTA country construction material. An offer based on use of the foreign construction material for which an exception was requested--

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of provision)

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond

supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.-

(c) The amount of the bid guarantee shall be 20 percent of the bid price or $3,000,000.00, whichever is less.-

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.-

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of clause)

52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least fifteen 15 percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

(End of clause)

52.236-16 QUANTITY SURVEYS (APR 1984)

(a) 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.

(b) The Government shall conduct the original and final surveys and make the computations based on them. The Contractor shall conduct the surveys for any periods for which progress payments are requested and shall make the computations based on these surveys. All surveys conducted by the Contractor shall be conducted under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific

instance.

(c) 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.

(End of clause)

52.244-2 SUBCONTRACTS (AUG 1998)

(a) Definitions. As used in this clause--

Approved purchasing system means a Contractor's purchasing system that has been reviewed and approved in accordance with Part 44 of the Federal Acquisition Regulation (FAR).

Consent to subcontract means the Contracting Officer's written consent for the Contractor to enter into a particular subcontract.

Subcontract means any contract, as defined in FAR Subpart 2.1, entered into by a subcontractor to furnish supplies or services for performance of the prime contract or a subcontract. It includes, but is not limited to, purchase orders, and changes and modifications to purchase orders.

(b) This clause does not apply to subcontracts for special test equipment when the contract contains the clause at FAR 52.245-18, Special Test Equipment.

(c) When this clause is included in a fixed-price type contract, consent to subcontract is required only on unpriced contract actions (including unpriced modifications or unpriced delivery orders), and only if required in accordance with paragraph (d) or (e) of this clause.

(d) If the Contractor does not have an approved purchasing system, consent to subcontract is required for any subcontract that--

(1) Is of the cost-reimbursement, time-and-materials, or labor-hour type; or

(2) Is fixed-price and exceeds--

(i) For a contract awarded by the Department of Defense, the Coast Guard, or the National Aeronautics and Space Administration, the greater of the simplified acquisition threshold or 5 percent of the total estimated cost of the contract; or

(ii) For a contract awarded by a civilian agency other than the Coast Guard and the National Aeronautics and Space Administration, either the simplified acquisition threshold or 5 percent of the total estimated cost of the contract.

(e) If the Contractor has an approved purchasing system, the Contractor nevertheless shall obtain the Contracting Officer's written consent before placing the following subcontracts:

_____

_____

(f)(1) The Contractor shall notify the Contracting Officer reasonably in advance of placing any subcontract or modification thereof for which consent is required under paragraph (c), (d), or (e) of this clause, including the following information:

(i) A description of the supplies or services to be subcontracted.

(ii) Identification of the type of subcontract to be used.

(iii) Identification of the proposed subcontractor.

(iv) The proposed subcontract price.

(v) The subcontractor's current, complete, and accurate cost or pricing data and Certificate of Current Cost or Pricing Data, if required by other contract provisions.

(vi) The subcontractor's Disclosure Statement or Certificate relating to Cost Accounting Standards when such data are required by other provisions of this contract.

(vii) A negotiation memorandum reflecting--

(A) The principal elements of the subcontract price negotiations;

(B) The most significant considerations controlling establishment of initial or revised prices;

(C) The reason cost or pricing data were or were not required;

(D) The extent, if any, to which the Contractor did not rely on the subcontractor's cost or pricing data in determining the price objective and in negotiating the final price;

(E) The extent to which it was recognized in the negotiation that the subcontractor's cost or pricing data were not accurate, complete, or current; the action taken by the Contractor and the subcontractor; and the effect of any such defective data on the total price negotiated;

(F) The reasons for any significant difference between the Contractor's price objective and the price negotiated; and

(G) A complete explanation of the incentive fee or profit plan when incentives are used. The explanation shall identify each critical performance element, management decisions used to

quantify each incentive element, reasons for the incentives, and a summary of all trade-off possibilities considered.

(2) The Contractor is not required to notify the Contracting Officer in advance of entering into any subcontract for which consent is not required under paragraph (c), (d), or (e) of this clause.

(g) Unless the consent or approval specifically provides otherwise, neither consent by the Contracting Officer to any
subcontract nor approval of the Contractor's purchasing system shall constitute a determination--

(1) Of the acceptability of any subcontract terms or conditions;

(2) Of the allowability of any cost under this contract; or

(3) To relieve the Contractor of any responsibility for performing this contract.

(h) No subcontract or modification thereof placed under this contract shall provide for payment on a cost-plus-a-percentage-of-cost basis, and any fee payable under cost-reimbursement type subcontracts shall not exceed the fee limitations in FAR 15.404-4(c)(4)(i).

(i) The Contractor shall give the Contracting Officer immediate written notice of any action or suit filed and prompt notice of any claim made against the Contractor by any subcontractor or vendor that, in the opinion of the Contractor, may result in litigation related in any way to this contract, with respect to which the Contractor may be entitled to reimbursement from the Government.

(j) The Government reserves the right to review the Contractor's purchasing system as set forth in FAR Subpart 44.3.

(k) Paragraphs (d) and (f) of this clause do not apply to the following subcontracts, which were evaluated during negotiations:

_____

_____

(End of clause)

52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996)

(a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components.

(b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The

Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.

(c) Government inspections and tests are for the sole benefit of the Government and do not--

(1) Relieve the Contractor of responsibility for providing adequate quality control measures;

(2) Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

(3) Constitute or imply acceptance; or

(4) Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) of this section.

(d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

(e) The Contractor shall promptly furnish, at no increase in contract price, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

(f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(g) If the Contractor does not promptly replace or correct rejected work, the Government may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed.

(h) If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and

reconstruction, including, if completion of the work was thereby delayed, an extension of time.

(i) Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://farsite.hill.af.mil/

(End of clause)

52.252-4 ALTERATIONS IN CONTRACT (APR 1984)

Portions of this contract are altered as follows:

(End of clause)

52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (APR 1984)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any _insert regulation name____ (48 CFR _____) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of clause)

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002) ALTERNATE III (MAY 2002)

(a) Definitions. As used in this clause --

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this

purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Maritime Administration, Office of Cargo Preference, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information:

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor shall insert the substance of this clause, including this paragraph (f), in subcontracts that are for a type of supplies described in paragraph (b)(2) of this clause.

(End of clause)

Section 00800 - Special Contract Requirements

CLAUSES INCORPORATED BY REFERENCE

52.211-13	Time Extensions	SEP 2000
52.236-3	Site Investigation and Conditions Affecting the Work	APR 1984
52.236-6	Superintendence by the Contractor	APR 1984
52.236-7	Permits and Responsibilities	NOV 1991
52.236-10	Operations and Storage Areas	APR 1984
52.236-11	Use and Possession Prior to Completion	APR 1984
52.236-12	Cleaning Up	APR 1984
52.236-13	Accident Prevention	NOV 1991
52.236-14	Availability and Use of Utility Services	APR 1984
52.236-15	Schedules for Construction Contracts	APR 1984
52.236-21	Specifications and Drawings for Construction	FEB 1997
252.227-7033	Rights in Shop Drawings	APR 1966
252.236-7001	Contract Drawings, Maps, and Specifications	AUG 2000

CLAUSES INCORPORATED BY FULL TEXT

52.231-5000 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE
MAR 1995)--EFARS

(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 condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot 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 EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region ____. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-

leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(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.

(End of clause)

52.236-5000 PLANT AND MATERIAL REMOVAL AFTER CONTRACT TERMINATION (MAR 1995)--EFARS

Should this contract be terminated as provided in clause 52.232-5001 because of the failure of Congress to provide additional funds for its completion, the contractor may be permitted to remove plant and material on which payments for preparatory work have been made, subject to an equitable deduction from the amounts due the contractor to reimburse the United States for the unabsorbed value of such plant and material.

(End of clause)

52.232-5000 PAYMENT FOR MATERIALS DELIVERED OFF-SITE (MAR 1995)--EFARS

(a) Pursuant to FAR clause 52.232-5, Payments Under Fixed Priced Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site will be limited to: (1) materials required by the technical provisions; or (3) materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

(b) Such payment will be made only after receipt of paid or receipted invoices or invoices with canceled check showing title to the items in the prime contractor and including the value of material and labor incorporated into the item. In addition to petroleum products, payment for materials delivered off-site is limited to the following items: _N/A____

(End of clause)

52.232-5001 CONTINUING CONTRACTS (MAR 1995)--EFARS

(a) This is a continuing contract, as authorized by Section 10 of the River and Harbor Act of September 22, 1922 (33 U.S. Code 621). The payment of some portion of the contract price is dependent upon reservations of funds from future appropriations, and from future contribution to the project having one or more non-federal project sponsors. The responsibilities of the Government are limited by this clause notwithstanding any contrary provision of the "Payments to Contractor" clause or any other clause of this contract.

(b) The sum of $3,000,000.00 has been reserved for this contract and is available for payments to the contractor during the current fiscal year. It

is expected that Congress will make appropriations for future fiscal years from which additional funds together with funds provided by one or more non-federal project sponsors will be reserved for this contract.

(c) Failure to make payments in excess of the amount currently reserved, or that may be reserved from time to time, shall not entitle the contractor to a price adjustment under the terms of this contract except as specifically provided in paragraphs (f) and (i) below. No such failure shall constitute a breach of this contract, except that this provision shall not bar a breach-of-contract action if an amount finally determined to be due as a termination allowance remains unpaid for one year due solely to a failure to reserve sufficient additional funds therefore.

(d) The Government may at any time reserve additional funds for payments under the contract if there are funds available for such purpose. The contracting officer will promptly notify the contractor of any additional funds reserved for the contract by issuing an administrative modification to the contract.

(e) If earnings will be such that funds reserved for the contract will be exhausted before the end of any fiscal year, the contractor shall give written notice to the contracting officer of the estimated date of exhaustion and the amount of additional funds which will be needed to meet payments due or to become due under the contract during that fiscal year. This notice shall be given not less than 45 nor more than 60 days prior to the estimated date of exhaustion.

(f) No payments will be made after exhaustion of funds except to the extent that additional funds are reserved for the contract. The contractor shall be entitled to simple interest on any payment that the contracting officer determines was actually earned under the terms of the contract and would have been made except for exhaustion of funds. Interest shall be computed from the time such payment would otherwise have been made until actually or constructively made, and shall be at the rate established by the Secretary of the Treasury pursuant to Public Law 92-41, 85 STAT 97, as in effect on the first day of the delay in such payment.

(g) Any suspension, delay, or interruption of work arising from exhaustion or anticipated exhaustion of funds shall not constitute a breach of this contract and shall not entitle the contractor to any price adjustment under the "Suspension of Work" clause or in any other manner under this contract.

(h) An equitable adjustment in performance time shall be made for any increase in the time required for performance of any part of the work arising from exhaustion of funds or the reasonable anticipation of exhaustion of funds.

(i) If, upon the expiration of sixty (60) days after the beginning of the fiscal year following an exhaustion of funds, the Government has failed to reserve sufficient additional funds to cover payments otherwise due, the contractor, by written notice delivered to the contracting officer at any time before such additional funds are reserved, may elect to treat his right to proceed with the work as having been terminated. Such a termination shall be considered a termination for the convenience of the Government.

(j) If at any time it becomes apparent that the funds reserved for any fiscal year are in excess of the funds required to meet all payments due or to become due the contractor because of work performed and to be performed under the contract during the fiscal year, the Government reserves the right, after notice to the contractor, to reduce said reservation by the amount of such excess.

(End of clause)

WAGE RATE DETERMINATION

General Decision Number: NJ030003 07/02/2004

General Decision Number: NJ030003 07/02/2004
NJ 07/08/04

Superseded General Decision Number: NJ020003

State: **New Jersey**

Construction Types: Building, **Heavy** and Highway

Counties: Bergen, **Essex,** Hudson, Hunterdon, Middlesex, Morris, Passaic, Somerset, Sussex, Union and Warren Counties in **New Jersey**.

BERGEN, **ESSEX,** HUDSON, HUNTERDON (Remainder), MIDDLESEX (Remainder), MORRIS, PASSIAC, SOMERSET (Remainder), SUSSEX, UNION, & WARREN (Remainder) COUNTIES:

BUILDING **CONSTRUCTION** PROJECTS (does not include residential **construction** consisting of single family homes and apartments up to and including 4 stories, does not include Hunterdon or Somerset Counties for building **construction** only)

HEAVY AND HIGHWAY **CONSTRUCTION** PROJECTS

Modification Number	Publication Date
0	06/13/2003
1	12/19/2003
2	01/23/2004
3	02/27/2004
4	03/05/2004
5	03/19/2004
6	05/07/2004
7	06/04/2004
8	07/02/2004

BOIL0028-001 08/01/2003

	Rates	Fringes

Boilermaker.....$ 34.63 20.45

CARP0006-001 05/01/2004

BERRGEN (East of Hackensack River including but not limited to Cliffside, Coytesville, Edgewater, Fairview, Fort Lee, Grant Wood, Leonia, Palisades Park, and Ridgefield Twps), AND HUDSON (East of the Hackensack River) COUNTIES

	Rates	Fringes
Carpenter.....	$ 33.38	15.02
Millwright.....	$ 33.07	44%+.21

CARP0015-001 05/01/2004

BERGEN COUNTY (Remainder)

	Rates	Fringes
Carpenter.....	$ 33.38	15.02
Millwright.....	$ 33.07	44%+.21

CARP0031-002 05/01/2004

HUNTERDON (Starting at the South of the town of Frenchtown on the Delaware River, thence following the line in the center of the road to Bapistown to Croton to the City of Flemington to Flemington Junction to Three Bridges, thence following the Somerset County line Northward, all territory South of this line including the City of Flemington) AND SOMERSET (all territory South of a line beginning at Armwell on the County line to Zion to Fairview to Dutchtown to Plainsville to Bell Mead to Griggstown to the Delaware and Raritan Canal) COUNTIES

	Rates	Fringes
Carpenter.....	$ 33.38	15.02

CARP0041-002 05/01/2004

ESSEX (Millburn Twp), MIDDLESEX, MORRIS, SOMERSET
(Municipalities of Greenbrook, North Plainfield, Watchung, and
all communities East of King George's Road), SUSSEX AND UNION
COUNTIES

	Rates	Fringes
Carpenter & Insulator.....	$ 33.38	15.02
Millwright.....	$ 33.07	44%+.21

CARP0099-001 05/01/2004

	Rates	Fringes
Lather.....	$ 33.38	15.02

CARP0124-001 05/01/2004

BERGEN (City of Garfield and Boroughs of Lodi and Wallington),
AND PASSAIC COUNTIES

	Rates	Fringes
Carpenter.....	$ 33.38	15.02
Millwright.....	$ 33.07	44%+.21

CARP0399-001 05/01/2004

WARREN COUNTY

	Rates	Fringes
Carpenter & Insulator.....	$ 33.38	15.02
Millwright.....	$ 33.07	44%+.21

CARP1342-001 05/01/2004

ESSEX, AND HUDSON (West of Hackensack River)

	Rates	Fringes
Carpenter	$ 33.38	15.02
Millwright	$ 33.07	44%+.21

CARP1456-001 05/01/2003

	Rates	Fringes
Diver Tender	$ 28.82	26.41
Diver	$ 38.28	26.41

CARP2212-001 11/01/2003

BERGEN, **ESSEX,** HUDSON, & PASSAIC COUNTIES

	Rates	Fringes
Soft Floor Layer	$ 32.22	44%+.21

ELEC0102-001 06/02/2003

MORRIS, PASSAIC, SUSSEX, UNION, AND WARREN COUNTIES

	Rates	Fringes
Line **Construction**:		
Cable Splicers	$ 42.13	42.5%
Groundmen	$ 22.98	42.5%
Lineman & Equipment Operators	$ 38.30	42.5%

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* ELEC0102-002 05/31/2004

MORRIS, PASSAIC, SUSSEX, UNION, AND WARREN COUNTIES

	Rates	Fringes
Cable splicer	$ 44.52	45%

Electrician.....$ 40.47 45%

ELEC0164-001 08/15/2000

BERGEN, **ESSEX,** AND HUDSON COUNTIES

	Rates	Fringes
Line **Construction**:		
Cable Splicer.....	$ 38.89	41%
Groundman.....	$ 20.66	41%
Lineman, Welder,X-Ray Technician, Equipment Repairman, & Equipment Serviceman.....	$ 34.42	41%

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* ELEC0164-002 05/31/2004

BERGEN, **ESSEX,** AND HUDSON COUNTIES

	Rates	Fringes
Cable splicer.....	$ 46.76	45.5%
Electrician.....	$ 41.10	45.5%

ELEC0262-002 08/15/1993

MIDDLESEX COUNTY (Area North and West of a line following the Philadelphia and Reading Railroad East from the Raritan River to Dismal Road, Northeast on Dismal Road to Park Avenue, North on Park Avenue to Lehigh Valley Railroad, and Northeast along that railroad to the Union County line)

	Rates	Fringes
Electrician.....	$ 25.92	6.09+20%

ELEC0262-006 11/30/1994

MIDDLESEX COUNTY (Area North and West of a line following the Philadelphia and Reading Railroad East from the Raritan River

to Dismal Road, Northeast on Dismal Road to Park Avenue, North
on Park Avenue to the Lehigh Valley Railroad, and Northeast
along that railroad to the Union County line)

	Rates	Fringes
Line **Construction**:		
Groundmen.....	$ 21.06	3.76+11.7%
Linemen, Cable Splicers.....	$ 22.87	3.76+11.7%

ELEC0358-001 06/01/1998

MIDDLESEX COUNTY (Remainder)

	Rates	Fringes
Electrician.....	$ 30.26	42.75%

ELEC0358-002 06/01/1998

MIDDLESEX COUNTY (Remainder)

	Rates	Fringes
Line **Construction**:		
Cable Splicer.....	$ 33.89	43%
Certified Welder Lineman....	$ 31.77	43%
Groundman & Winch Operator..	$ 29.47	43%
Linemen, Hole Digger Operator, Truck w/o Winch or Pole & Steel Hand, Truck w/o Winch, X-ray Technician & Equip. Repairer	$ 30.26	43%

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* ELEC0456-001 05/31/2004

MIDDLESEX COUNTY (Area South and West of a line extending East
from the Raritan River along the Philadelphia and Reading
Railroad to Shelton Rd, South on Shelton Rd to Lincoln Hwy to
Vineyard Rd to Old Post Rd, along Old Post Rd to Mill Rd, along

Mill Rd to the Raritan River, along the Raritan River to South
River, along South River to the Southern boundary of the
Borough of South River, along this boundary to Cranbury South
River Turnpike, along this road continuing on to Washington Rd
and Maplewood Ave in Cranbury to Scott Ave, along Scott Ave to
Main St, on Main St and the turnpike to Millstone River)

	Rates	Fringes
Cable splicer	$ 42.04	47%
Electrician	$ 39.92	47%

ELEC0456-002 06/03/2002

MIDDLESEX COUNTY (Area South and West of a line extending East
from the Raritan River along the Philadelphia and Reading
Railroad to Shelton Rd, South on Shelton Rd to Lincoln Hwy to
Vineyard Rd to Old Post Rd, along Old Post Rd to Mill Rd, along
Mill Rd, along Mill Rd to the Raritan River, along Raritan
River to South River, along South River to the Southern
boundary of the Borough of South River, along this boundary to
the Cranbury South River Turnpike, along this road continuing
on to Washington Rd and Maplewood Ave in Cranbury to Scott Ave,
along Scott Ave to Main St, on Main St and the turnpike to
Millstone River)

	Rates	Fringes
Line **Construction**:		
Cable Splicer	$ 38.95	45.75%
Groundmen	$ 33.98	45.75%
Linemen	$ 34.77	45.75%
Winch Operator	$ 33.98	45.75%

ELEV0001-001 01/01/2004

	Rates	Fringes

Elevator Mechanic
Construction.....$ 39.265 14.845+A+B+C
Modernization.....$ 31.43 14.695+A+B+C

FOOTNOTES:
A. PAID HOLIDAYS: **New** Year's Day, Lincoln's Birthday, Washington's Birthday,
Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day

B. Employee with 6 months but less than 5 years of service receive 2 weeks vacation, and 3 weeks vacation for 5 years or more of service.

C. Employee with 6 months, but less than 5 years of service receive 2 weeks vacation, and 3 weeks vacation for 5 years or more of service.

ENGI0825-004 07/01/2003

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 35.64	18.15+A+B
GROUP 2	$ 35.73	18.15+A+B
GROUP 3	$ 33.34	18.15+A+B
GROUP 4	$ 30.78	18.15+A+B
GROUP 5	$ 29.25	18.15+A+B
GROUP 6	$ 27.49	18.15+A+B
GROUP 7	$ 38.00	18.15+A+B
[STEEL ERECTION]:		

FOOTNOTES:
A. PAID HOLIDAYS: **New** Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day.
B. Employees receive 20% premium pay for hazardous waste work.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS
[STEEL ERECTION]

GROUP 1: Cranes - (all cranes, land or floating with booms including job 140 ft. and over, above ground); derricks-(all derricks, land or floating with boom including jib 140 ft. and over, above ground).

GROUP 2: Cranes - (all cranes, land or floating with booms including jib less than 140 ft. above ground); derricks (all derricks, land or floating with booms including jib, less than 140 ft. above ground).

GROUP 3: "A" frame; cherry pickers 10 tons and under; hoists; all types hoists shall also include steam, gas, diesel, electric, air hydraulic, single and double drum, concrete, brick shaft caisson, or any other similar type hoisting machines, portable or stationary, except Chicago boom type; jacks-screw air hydraulic power operated unit console type (not hand jack or pile load test type) side booms.

GROUP 4: Aerial platform used hoist; compressor, 2 or 3 in battery; elevators or house cars; conveyors and tugger hoists; fireman; forklift; generators, 2 or 3 maintenance-utility man; rod bending machine (power); welding machines--(gas or electric, 2 or 3 in battery, including diesels); captain power boats; tug master power boats.

GROUP 5: Compressor, single, welding machine, single, gas, electric converters of any type, diesel; welding system multiple (rectifier transformer type); generator, single.

GROUP 6: Oiler staddle carrier.

GROUP 7: Helicopter pilot

ENGI0825-005 07/01/2003

	Rates	Fringes
Power equipment operators:		

GROUP 1.....$ 34.50 18.15+A+B
GROUP 2.....$ 33.85 18.15+A+B
GROUP 3.....$ 30.71 18.15+A+B
GROUP 4.....$ 29.31 18.15+A+B
GROUP 5.....$ 27.49 18.15+A+B
GROUP 6.....$ 36.43 18.15+A+B

OILOSTATIC MAINLINES & TRANSPORTATION PIPELINES:

FOOTNOTES:

A. PAID HOLIDAYS: **New** Year's Day; Washington's Birthday, Memorial Day; Independence Day; Labor Day; Veteran's Day, Thanksgiving Day; and Christmas Day

B. Employee receives 20% premium pay for hazardous waste work.

OILOSTATIC MAINLINES AND TRANSPORTATION PIPE LINES CLASSIFICATIONS

GROUP 1: Backhoe; cranes (all types); draglines; front-end loaders (5 yds. and over); gradalls; scooper (loader and shovel); koehring and trench machines.

GROUP 2: "A" frame; backhoe (combination hoe loader); boring and drilling machines; ditching machine, small; ditchwitch or similar type; fork lifts; front end loaders (2 yds and over but less than 5 yds.); graders, finish (fine); hydraulic cranes, 10 tons and under (over 10 tons - crane rate applies); side booms; and winch trucks (hoisting).

GROUP 3: Backfiller; brooms and sweepers; bulldozers; compressors (2 or 3 in battery); front-end loaders (under 2 yds.); generators; giraffe grinders; graders and motor patrols; mechanic; pipe bending machine (power); tractors; water and sprinkler trucks, welder and repair mechanic.

GROUP 4: Compressor (single); dope pots (mechanical with or with out pump); dust collectors; farm tractors; pumps (4 in. suction and over); pumps (2 or less than 4 in. suction); pumps; diesel engine and hydraulic (immaterial or power); welding machines; gas or electric converters of any type, single; welding machines, gas or electric converters of any type, 2 or 3 in battery multiple welders; wellpoint systems (including installation and maintenance).

GROUP 5: Oiler, grease, gas, fuel and supply trucks and tire repair and maintenance.

GROUP 6: Helicopter-pilot.

ENGI0825-009 07/01/2003

BUILDING **CONSTRUCTION** PROJECTS; **HEAVY,** HIGHWAY, ROAD, STREET AND SEWER PROJECTS:

	Rates	Fringes
Power Equipment Operator		
GROUP 1	$ 33.87	18.15+A+B
GROUP 2	$ 32.28	18.15+A+B
GROUP 3	$ 30.37	18.15+A+B
GROUP 4	$ 28.74	18.15+A+B
GROUP 5	$ 27.03	18.15+A+B
GROUP 6	$ 35.69	18.15+A+B

FOOTNOTES:

A. **New** Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day, plus Washington's Birthday and Veterans Day.

B. Employee receives 20% premium pay for hazardous waste work.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Autograde - combination subgrader; base metal spreader and 7 base trimmer (CMI and similar types); autograde placer, trimmer, spreader combination (CMI and similar types); autograde slipform paver (CMI and similar types); backhoe; central power plants (all types); concrete paving machines; cranes (all types, including overhead and straddle traveling type); cranes; gantry; derricks (land or floating); drillmaster, quarrymaster (down the hole drill) rotary drill; self propelled hydraulic drill; self-powered drill; dragline; elevator graders; front end loaders (5 yds. and over); gradalls; grader; raygo; locomotive (large); mucking machines; pavement and concrete

breaker, i.e.; superhammer and hoe ram; pile driver; length of boom including length of leads, shall determine premium rate applicable; roadway surface grinder; scooper (loader and shovel); shovels; tree chopper with boom; trench machines.

GROUP 2: "A" frames backhoe (combination); boom attachment on loaders (rate based on size of bucket) not applicable to pipehook, boring and drilling machines; brush chopper; shreader and tree shredder; tree shedder; cableways; carryalls; concrete pump; concrete pumping system; pumpcrete and similar types; conveyors, 125 ft. and over; drill doctor including dust collector, maintenance); front end loaders (2 yds. but less than 5 yds.); graders (finisher); groove cutting machine (ride on type); header planer; hoists; (all types hoists, shall also include steam, gas, diesel, electric, air hydraulic, single and double drum, concrete brick shaft caisson, snorkel roof, and/or any other similar type hoisting machines, portable or stationary, except Chicago boom type); hoists (Chicago boom type); hydraulic cranes, 10 tons and under; hydro-axle; jacks screw air hydraulic power operated unit or console type (not hand jack or pile load test type); log skidder; pans; pavers (all concrete; pumpcrete machines; squeezecrete and concrete pumping (regardless of size); scrapers; side booms; straddle carrier; ross and similar types; winch truck (hoisting).

GROUP 3: Asphalt curbing machine; asphalt plant engineer; asphalt spreader; autograder tube finisher and texturing machine (CMI and similar types); autograde curercrete machine (CMI and similar types); autograde curb trimmer and sidewalk; shoulder; slipform (CMI and similar types); bar bending machines (power); batchers; batching plant and crusher on site; belt conveyor systems; boom type skimmer machines, bridge deck finisher; bulldozers (all); car dumpers (railroad); compressor and blower type units (used independently or mounted on dual purposes trucks, on job site or in conjunction with job site, in loading and unloading of concrete, cement, fly ash, instancrete, or similar type materials); compressor (2 or 3) (battery); concrete finishing machines; concrete saws and cutters (ride on type); concrete spreaders; hetzel; rexomatic and similar types; concrete vibrators; conveyors; under 125 ft.; crushing machines; ditching machine; small (ditchwitch

or similar type); dope pots (mechanical with or without pump); dumpsters elevators fireman; fork lifts (economobile; lull and similar types of equipment); front end loaders (1 yd. and over but less than 2 yds.); generators (2 or 3) in battery; giraffe grinders; graders and motor patrols; gunnite machines (excluding nozzle); hammer vibratory (in conjunction with generator); hoist (roof, tugger, aerial platform hoist and house cars); hoppers; Hopper doors (power operated); ladders (motorized); laddervator; locomotive; dinky type; maintenance; utility man; mechanics; mixers (except paving mixers); motor patrols and graders; pavement breakers, small; self- propelled ride on type (also maintaining compressor or hydraulic unit); pavement breaker; truck mounted; pipe bending machine (power); roller; black top; scales; power; seaman pulverizing mixer; shoulder widener; silos; skimmer machines (boom type); steel cutting machine; services and maintaning; tractors; tug captain; vibrating plants (used in conjunction with unloading); welder and repair mechanics, concrete cleaning/ decontamination machine operstor, directional boring machine, **heavy** equipment robotics operator/technician, master environmental maintenance technician, ultra high pressure waterjet cutting tool system operator/maintenance technician vacuum blasting machine operator/maintenance technician.

GROUP 4: Brooms and sweepers, chippers, compressor (single), concrete spreaders (small type), conveyor loaders (not including elevator graders), engines, large diesel (1620 H.P.) and staging pump, farm tractors; fertilizing equipment (operation and maintenance) fine grade machine (small type); form line graders (small type); front loader (under 1 yd.); generator (single); grease, gas, fuel and oil supply trucks; heaters (nelson or other type including propane, natural gas or flow-type units); lights; portable generating light plants; mixers; concrete small; mulching equipment (operation and maintenance) pumps (4 inch suction and over including sumbersible pumps); pumps (2 or less than 4" suction and over including sumbersible pumps); pumps (diesel engine and hydraulic) immaterial of power road finishing machines (small type); rollers; grade; fill or stone base; seeding equipment (operation and maintenance of); sprinkler and water pump trucks steam jennies and biolers, stone spreader; tamping machines vibrating ride-on; temporary heating plany (nelson or other type,

including propane, natural gas or flow type units); water and sprinkler trucks; welding machines (gas, diesel, and/or electric converters of any type, single; two or three in a battery); welding systems, multiple (rectifier transformer type); wellpoint systems.

GROUP 5: Oiler.

GROUP 6: Helicopter pilot.

IRON0011-002 07/01/2002

BERGEN, **ESSEX,** HUDSON, HUNTERDON (Western half),MIDDLESEX (North half), MORRIS, PASSAIC, SOMERSET (North Half), SUSSEX AND UNION COUNTIES

	Rates	Fringes
Ironworkers:		
Reinforcing.....	$ 27.63	24.10
Structural.....	$ 29.53	24.10

IRON0036-003 07/01/2003

	Rates	Fringes
Ironworkers; Structural, Reinforcing and Ornamental..... Projects under $25 million:	$ 29.95	14.02

IRON0068-004 07/01/2003

HUNTERDON (Eastern half), MIDDLESEX (South half), AND SOMERSET (South half) COUNTIES

	Rates	Fringes
Ironworkers:		
Rerinforcing (Concrete Rods)	$ 26.41	23.80
Structural, Ornamental.....	$ 28.41	23.80

LABO0021-001 05/01/2002

	Rates	Fringes
Laborers Building **Construction.** Class A Laborer	$ 22.95	11.77

Class A Laborer:Jack Hammer, Tamper,Operator of Motorized tamper and compactor, operator of hydro demolition equipment, operator of all types of motorized forklifts, operator of motor buggy, operator of conveyor, operator of bobcat, demolition burners, nozzle operator on gunnite, scaffold builder, & mortar man (except silofed).

Class B Laborer:all laborers not listed in Class A or C

Class C Laborer:Laborers doing janitorial-type light clean-up work associated with the turnover of the project or part of a project to the owner.

LABO0072-001 05/01/2002

MIDDLESEX COUNTY (Perth Amboy, Carteret, Woodbridge, Metuchen Twps, South River, Sayreville, South Amboy, Old Bridge, East Brunswick, Spotswood, Jamesburg, Helmetta, Cranbury & Monroe Twps)

	Rates	Fringes
Laborers Building **Construction.** Class A	$ 22.95	11.77

Class A-Jack Hammer, Motorized Tamper & Compactor, Street Cleaning Machines, Scaffold Builders, Hydro Demolition Equipment, all types of Motorized Fork Lifts, Riding Motor Buggy Operator, Bobcat Operator, Mortar Man, & Nozzle Man on Gunnite work.

CLASS B All Laborers not listed in Class A or C.

CLASS C Laborers doing Janitorial type light clean up work associated with the turnover of the project to the owner All Flagman, and those manning temporary heat of all types

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* LABO0156-002 05/01/2002

MIDDLESEX (Remainder), and SOMERSET (East Millstone and Franklin Townships) COUNTIES:

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

LABO0232-001 05/01/2002

SOMERSET COUNTY (Bernardsville,Peapack, Gladstone, Far Hills, Bernards, and Bedminster Twps):

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold

Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0239-001 05/01/2002

PASSAIC COUNTY (Twps or Boroughs of Passaic, Garfield, Lodi, Wallington, Delawanna, Allwood, Athenia, Clifton to Piaget Ave,
Paterson, Albion Place, Lettle Falls, Totowa, West Paterson, Wayne Hawthorne, Pompton, Haledon, West Milford, Ringwood, Bloomingdale, East Paterson to the Garfield boundary line)

	Rates	Fringes
Laborers Building **Construction**		
GROUP 1	$ 22.95	11.77
GROUP 2	$ 22.45	11.77
GROUP 3	$ 19.16	11.77

GROUP 1-Specialist laborer classification including jack hammer, tamper, motorized tampers and compactors, street cleaning machines, scaffold builder, hydro demolition equipment, all types of motorized fork lifts, riding motor buggy operator, conveyor operator, Bobcat operator, mortar man, burners, nozzle man on gunite work, Mortar man shall include all laborers engaged in any mode of mixing aggregate by hand or mechabical means with the exception of silo work.

GROUP 2-Basic laborer's rate and includes all work not included in GROUP 1 or GROUP 3.

GROUP 3-Laborers doing janitorial- type light clean-up work

associated with the turnover of the project or part of a project to the owner.

LABO0346-001 05/01/2002

BERGEN COUNTY (Cliffside; Borough of Cliffside Park; Borough of
Fort Lee South of Central Blvd; Borough of Palisades Park South
of Central Blvd; Borough of Ridgefield; Borough of Edgewater;
Borough of FAirview; Hackensack; City of Hackensack; Hasbrouck
Heights; Little Ferry; South Hackensack; Ridgefield Park;
Bogota; Teaneck Twp. West of Teaneck Rd. and South of Fort Lee
Rd.; Maywood; Saddle Brook Twp; Borough of Paramus East of
Sprout Brook; Borough of River Edge; **New** Milford; Teterboro;
Bendix; Tochell Park; Englewood; City of Englewood; Borough of
Dumont; Borough of Bergenfield; Borough of Palisades Park North
of Central Blvd. to Edgewater; Fort Lee to the Hudson River;
Borough of Fort Lee North of Central Blvd.; Twp. of Teaneck,
East of Teaneck Rd. and North of Fort Lee Rd.; Borough of
Leonia; Borough of Englewood Cliffs; Borough of Tenafly;
Borough of Cresskill; Borough of Demarest; Borough of Closter;
Borough of Oradell; Borough of Montvale; Borough of Woodcliff
Lake; Borough of Park Ridge; Borough of Hillsdale; Twp. of
Washington; Borough of Westwood; Borough of Emerson; Borough of
Haworth; Borough of Alpine; Borough of Rockleigh; Borough of
Norwood; Borough of Harrington Park; Borough of Old Tappan;
Borough of Northvale; Township of Rivervale; Lyndhurst;
Rutherford; East Rutherford; Wood-Ridge; Carlton; Carlstadt;
North Arlington; Moonachie; Ridgewood; Village of Ridgewood;
Borough of Fair Lawn; Borough of Glen Rock; Borough of Hohokus;
Borough of Saddle River; Borough of Upper Saddel River; Borough
of Allendale; Borough of Ramsey; Borough of Waldwick; Borough
of Midland Park; Borough of Oakland; Borough of Franklin Lakes;
Twp. of Wyckoff; Twp. of Hohokus; Borough of Paramus except

East of Sprout Brook; and Borough of MAhwah)

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0394-001 05/01/2002

UNION COUNTY:

	Rates	Fringes
BUILDING **CONSTRUCTION**		
GROUP 1	$ 22.95	11.77
GROUP 2	$ 22.45	11.77
GROUP 3	$ 19.16	11.77
LABORERS:		

GROUP 1-Specialist laborer classicication including jack hammer, tamper, motorized tampers and compactors, street cleaning machines, scafford builder, hydro demolition equipment, all types of motorized fork lifts, riding motor buggy operator, conveyor operator, Bobcat operator, mortar man, burners, nozzle men on gunite work. Mortar men shall include all laborers engaged in any mode of mixing

aggregate by hand or mechanical means with the exception of silo fed.

GROUP 2-Basic laborer's rate and includes all work not included in GROUP 1 or GROUP 3.

GROUP 3-Laborers are laborers doing, janitorial-type light clean-up work associated with the turnover of the project or part of a project to the owner, and all flagman, watchman, firewatch personnel, and those manning temporary heat of all types.

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* LABO0472-002 03/01/2002

	Rates	Fringes
Laborers: (FREE AIR TUNNEL)		
GROUP 1	$ 27.25	12.95+A
GROUP 2	$ 23.85	12.95+A
GROUP 3	$ 23.70	12.95+A
GROUP 4	$ 23.20	12.95+A

FOOTNOTE:
A. PAID HOLIDAYS: **New** Year's Day; Washington's Birthday, Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day; Presidential Election Day; and Veterans Day; provided the employee works on 3 days for the same Employer within a period of ten working days consisting of five working days before and five working days after the day upon which the holiday falls or is observed.

LABORERS CLASSIFICATIONS
[FREE AIR TUNNEL]

GROUP 1: Blasters

GROUP 2: Skilled men (including miners; drill runners; iron men mainrenance men; conveyor men; safety miners; riggers; block layers; cement finishers; rodmen; caulkers; powder Ccarrier; all other skilled men)

GROUP 3: Semi-skilled men (including chuck tenders; trackmen; nippers; brakemen; derail men; cable men; hose men; grout

men; gravel men; form men; bell or signal men (top or bottom); form workers and movers; concrete workers; shaft men; tunnel laborers; all other semi-skilled men)

GROUP 4: All other top laborers

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* LABO0472-003 03/01/2003

	Rates	Fringes
Laborers:		
GROUP 1	$ 25.30	11.80+A
GROUP 2	$ 25.50	11.80+A
GROUP 3	$ 25.80	11.80+A
GROUP 4	$ 26.00	11.80+A
GROUP 5	$ 26.25	11.80+A
GROUP 6	$ 29.80	11.80+A
GROUP 7a	$ 28.30	11.80+A
GROUP 7b	$ 26.30	11.80+A

HEAVY AND HIGHWAY **CONSTRUCTION**

FOOTNOTE:
A. PAID HOLIDAYS: **New** Year's Day; Washington's Birthday; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day; Presidential Election Day; and Veteran's Day; provided the employee works on 3 days for the same Employer within a period of ten working days consisting of five working days before and five working days after the day upon which the holiday falls or is observed.

LABORERS CLASSIFICATIONS **HEAVY** & HIGHWAY

GROUP 1: Common laborers; landscape laborers; railroad track laborers; pitmen and dumpmen; waterproofing; rakers and tampers on cold patch work and wrapping and coating all pipe Asphalt Laborers:

GROUP 2: Powder carriers and magazine tenders; signalmen Asphalt Raker, & Asphalt Screedman

GROUP 3: Sewer pipe; laser men; conduit and duct line layers;

jackhammer; chipping hammers; pavement breakers; power buggies; concrete cutters, asphalt cutters; sheet hammer and tree cutter operators; sandblasting, cutting, burning, Power Tool Operator, and such other power tools used to perform work usually done manaully by laborers

GROUP 4: Wagon drill operator; timberman; drill master

GROUP 5: Finisher; form setter; rammer; paver; gunite nozzle man and stone cutter; Catch Basin or Inlet Builder Manhole

GROUP 6: Blaster

GROUP 7a:Hazardous waste laborer required to wear level A,B, or C personal protection.

GROUP 7b:Certified laborer working a hazardous waste removal project or site at a task requiring hazardous waste related certification, but who is not working in a zone requiring level A.B. or C personal protection.

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* LABO0502-001 05/01/2002

ESSEX COUNTY (City of East Orange, Twps of South Orange and Maplewood, Cities of Orange and West Orange):

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0526-001 05/01/2002

MORRIS COUNTY (Remainder):

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0569-001 05/01/2002

HUNTERDON AND WARREN COUNTIES:

	Rates	Fringes
Laborers Building **Construction.**	$ 22.95	11.77

CLASS A

DEFINATION OF LABORERS:

CLASS A-Jack Hammer, Tamper, Motorized Tampers and Compactors, Street Cleaning Machines, Scaffold Builder, Hydro Demolition Equipment, All types of Motorized Fork Lifts, Riding Motor Buggy Operator, Bobcat Operator, Mortar Man, Burners, Nozzle Man on Gunite work.

CLASS B-All Laborers not listed in Class A or C.

CLASS C-Laborers doing Janitorial- type light clean up work associated with the turnover of the project to the owner All Flagman, and those manning tempory heat of all types.

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* LABO0694-001 05/01/2002

ESSEX COUNTY (Montclair):

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0711-001 05/01/2002

MORRIS COUNTY (Morristown, Morris Twp., Morris Plains,Mendham, Ralston, Chester, Brookside, Flanders, Ironia, Mount Freedom, Mount Tabor, Parsippany, Troy Hills, Pine Brook,Ced Knools, Whippany, Hanover Twp. and Long Valley):

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0779-002 05/01/2002

SOMERSET COUNTY (Bridgewater,Branchburg, Raritan, Bound Brook, Somerville, Manville, Hillsboro, Millstone, Montgomery and Rocky Hill Twp.):

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* LABO0913-001 05/01/2002

MORRIS (Jefferson, Rockaway, Mount Arlington, Rockaway Borough, Wharton, Mine Hill, Dover, Netcong, Roxbury, Mount Oliver, Randloph, Boonton, Boonton Twp.,Montville, Lincoln Park Borough, Butler, Kinnelon Borough, Pin Brook, Towaco, Danville, Mountain Lakes, Pequannock, Pompton Plains, Riverdale Borough Twps) AND SUSSEX COUNTIES

	Rates	Fringes
Laborers Building **Construction.**	$ 22.95	11.77

Class A Laborer:

Class A Laborer:Jack Hammer,tamper, motorized tampers and compactors, street cleaning machines, scaffold builder, hydro demolition equipment, all types of motorized fork lifts, bobcat operator, riding motor buggy operator, conveyor operator mortar man (except silo feed operations), burners, & nozzle man on gunnite work.

Class B Laborer:All laborers not listed in Class A.

Class C Laborer:Laborers doing Janitorial type light clean up work, associated with the turnover of the project to the

owner All Flagman, and those manning temporary heat of all types.

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* LABO1030-001 04/01/2001

LABORERS: (The removal, abatement, enclosure and decontamination of personal protective equipment, chemical protective clothing and machinery relating to asbestos and/or toxic and hazardous waste of materials which shall include but not necessarily be limited to: the erection, moving, servicing and dismantling to all enclosures, scaffolding, barricades, and the operation of all tools and equipment normally used in the removal or abatement of asbesots and toxic and hazardous waste or materials, the labeling, bagging, cartoning, crating, or other packaging of materials for disposal; and the clean up of the work site and all other work incidental to the removal, abatement, encapsulation, enclosure, and decontamination of asbestos or toxic and hazardous waste materials; and in addition, all work tasks involved in the maintenance and operation of energy resource recover plants (co- generation plants).)

	Rates	Fringes
Laborer	$ 21.85	10.12

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* LABO1153-001 05/01/2002

	Rates	Fringes
Laborers:		
Group 1	$ 22.95	11.77
Group 2	$ 22.45	11.77
Group 3	$ 19.16	11.77

Group 1-Jack Hammers,Tampers,Motorized Tampers and Compactors,Street Cleaning Machines,Scaffold Builder,Hydro Demolition Equipment, all types of

Motorized fork lifts riding Motor Buggy operator,Conveyor operator, Bobcat operator,Mortar Man,Burners, Nozzle man on gunite work, Mortar Man shall include all laborers engaged in any mode of mixing aggregate by hand or mechanical means with the exception of silo work.

Group 2-Basic laborer's rate and includes all work not included in Group 1 or Group 3

2.Group 3-Laborers doing janitorial-type clean-up work associated with the turnover of the project or part of a project to the owner.

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* PAIN0711-002 05/01/2000

	Rates	Fringes
Painters:		
NEW:		
Bridge	$ 31.25	2.55+27%
Painters	$ 28.75	2.55+27%
Paperhangers	$ 28.75	2.55+27%
Spray,Sandblast,High Work	$ 31.25	2.55+27%
REPAINT:		
Painters	$ 22.00	2.55+27%
Spray,sandblast,High Work	$ 24.00	2.55+27%

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* PAIN0711-003 05/01/2000

	Rates	Fringes
Glazier	$ 28.75	10.30
Glaziers- High Work	$ 29.75	10.30

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* PAIN0711-006 08/01/1999

	Rates	Fringes
Drywall Finisher/Taper	$ 28.25	11.23

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* PLAS0008-006 11/01/2001

HUNTERDON,MIDDLESEX,& SOMERSET COUNTIES:

	Rates	Fringes
Plasterer.....	$ 28.50	13.40

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* PLAS0029-001 05/01/2003

BERGEN,ESSEX,HUDSON,MORRIS,PASSAIC,SUSSEX, UNION & WARREN COUNTIES:

	Rates	Fringes
Cement Masons & Plasterers.....	$ 31.00	12.50

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* PLUM0009-001 03/01/2004

	Rates	Fringes
Air Conditioning & Refrigeration Mechanic.....	$ 26.92	11.33+A

Installation of refrigeration equipment for any type of building where the combined compressor tonnage does not exceed 5 tons, Installation of water-cooled air conditioning that does not exceed 10 tons (includes the piping of compenent system and the erection ofthe water tower), Installation of ai cooled air conditioning that does not exceed 15 tons

FOOTNOTE: A. Paid Holidays: **New** Year's Day, Washington's Birthday, Memorial Day, Independence Labor Day, Thanksgiving Day, Christmas Day, plus Washington's Birthday and Veterans Day.

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* PLUM0009-002 07/01/2003

HUNTERDON (Remainder), MERCER,MIDDLESEX (Excluding Dunellen,Borough, East Bound Brook, Middlesex, **New** Market, Oak Tree, Piscataway Twp and South Plainfield), AND SOMERSET

(Remainder) COUNTIES

	Rates	Fringes
Plumbers and Pipefitters.....	$ 36.88	17.00

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* PLUM0014-002 11/01/2003

BERGEN, HUDSON (Bayonne, Guttenberg, Hoboken, **Jersey** City, North Bergen, Secaucus, Union City, Weehawken, West **New** York), MORRIS (From Mount Olive straight across Randolph down to the **Essex** border), PASSAIC, SUSSEX, AND WARREN (Northern half) COUNTIES

	Rates	Fringes
Plumber.....	$ 37.56	17.29

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* PLUM0024-001 05/01/2003

Essex:

HUDSON (East Newark,Harrison,& Kearney only);

HUNTERDON (Alexandria, Alexandria Twp., Alexauken, Allens Corner, Allerton, Amsterdam, Annadale, Anthony, Baptistown, Bellewood, Bethlehem, Twp., Bissell, Bloomsbury, Bunnvale, Bottonwood Corners, Centerville, Charlestown, Cherryville, Clinton, Clinton Twp., Cokebury, Coles Mills, Croton, Delaware Twp., Dilts Corner East Amwell Twp., Everittstown, Fairmount, Farmersville, Franklin Twp., Frenchtown, Glen Gardner, Grandin, Hamden, Hampton, Higginsville, High Bridge, Hoffmans, Holland Twp., Highesville, Johnsons, Jutland, King, Kingwood Twp., Klinesville, Landsdowne, Lebanon, Lebanon Twp., Little Brook, Little Neck, Little York, Ludlow, McPherson, Milford, Moutainville, Mount Joy, Mount Pleasant, North Salem, Muirshead, **New** Germantown, **New** Hampton, Newport, Norton, Oak Grove, Oldwick, Palmyra, Palmyra Corners, Pattenburg, Perryville, Pittstown, Pleasant Run, Polktown, Potterstown, Quakertown, Raritan Twp., Readington, Readington Twp., Reaville, Rileyville, Riverside, Rockafellows, Rowland Mills

Sidney, Snydertown, Spring Mills, Stanton, Stanton Station Sunnyside, Sutton, Tewksbury, Tewksbury Twp.,The Point, Three Bridges, Treasure Island, Tumble, Union, Union Twp., Unionville Van Syckle, Warren Paper Mills, Wertsville, West End, West Portal White House, Whitehouse Station, Woodglen).

MIDDLESEX (Dunellen Borough, East Bound Brook, Middlesex, **New** Market, Oak Tree, Piscataway Twp., & South Plainfield only).

MORRIS (Bartley, Berkshire Valley, Bertland Island, Brookside, Chatham, Chatham Twp., Chester, Chester Twp., Cooks Bridge, Crestmoore, Gillette, Harding Twp., Ironia, Logansville, Long Valley, Malapardis, Mendham, Mendham Twp., Middle Valley, Millington, Milltown, Milton, Mount Freesom, Mount Olive Twp.,Mount Paul, Myerstown, Maughright, **New** Vernon, Parker, Passaic Twp, Pleasant Grove, Ralston, Schooleys, Mount Stanley, Stephensonburg, Stirling, & Washint Twp.)

SOMERSET (Amwell, Basking Ridge, Bedminster, Bedminster Twp., Bernards Twp., Bernardsville, Blaziers Corner, Bound Brook, Bradley Gardens, Branchburg Twp., Bridgewater Twp., Burnt Mill, Centerville, Chimney Rock, Claver Hill, Dutchtown, Far Hills Borough, Finderne, Flagstown, Frank Fort, Franklin Park, Franklin Twp., Gallia, Gladstone, Greater Cross Roads, Hamilton, Harmony, Harmony Colony, Higgins Mills, Hillsborough Twp., Lamington, Lanes Crossing, Liberty Corners, Lyons, Madisonville, Manville, Manville Borough, Martinsville, Mettler, Millstone, Mine Brook, Montgomery, Montgomery Twp., Mount Bethel, Mount Horeb, Neshanic, Neshanic Station, North Branch, North Branch Depot, North Plainfield, Peapack, Peapack-Gladstone, Plainville Plukemin, Pottersville, Raritan, Ravine Lake, Rock Mill, Round Top, Roycefield, Royce Valley, Seeley Mills, Smalleytown, Somerset, Somerville, Stone House, Sunset Lake, Union Village, Vliettown, Watchung, West Millington, Weston, White Bridge, Woodfern, Zarepat, & Zion).

UNION &

WARREN (Anderson, Asbury, Beattystown, Brainards, Brass Castle,

Broadway, Buttzville, Carpetersville, Changewater, Cornish, Finesville, Foul Rift, Franklin Twp., Greenwich Twp., Harmony, Harmony Station, Harmony Twp., Haszen, Hope Twp., Hutchinson, Karrville, Kennedy, Lopatconq, Lopatconq Twp., Lower Harmony, Mansfield Twp., Montana, **New** Village, Oxford, Oxford Twp.,Pequest, Pleasant Valley, Port Colden, Port Murray, Riegelsville, Rockport, Rocksbury, Roxburgh, Springtown, Stewartsville, Still Valley, Vulcanite, Warren Glen, Washington, Washington Twp., White Top, & Phillipsburg Twp.) COUNTIES:

	Rates	Fringes
Plumber (Excludes Somerset-Bldg).....	$ 37.28	16.45

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* PLUM0274-002 05/01/2004

BERGEN, HUDSON, MORRIS (Remainder), PASSAIC, SUSSEX, AND WARREN (Remainder) COUNTIES

	Rates	Fringes
Pipefitter.....	$ 38.93	18.07

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* PLUM0475-001 05/01/2004

ESSEX; HUNTERDON (Alexandria, Alexandria Twp, Alexauken, Allens Corner, Allertown, Amsterdam, Annandale, Anthony, Baptistown, Bellewood, Bethlehem Twp, Bissell, Bloomsbury, Bunnvale, Buttonwood Corners, Centerville, Charlestown, Cherryville, Clinton, Cokebury, Coles Mills, Croton, Delaware Twp, Dilts Corner, East Amwell Twp, Evittstown, Fairmount, Farmersville, Franklin Twp, Frenchtown, Glen Gardner, Grandin, Hamden, Hampton, Higginsville, High Bridge, Hoffmans, Holland Twp, Hughesville, Johnsons, Jutland, King, Kingwood Twp, Klinesville, Landsdowne, Lebanon, Lebanon Twp, Little Brooke, Little Neck, Little York, Ludlow, McPherson, Milford, Mountainville, Mount Joy, Mount Pleasant, Mount Salem, Muirshead, **New** Germantown, **New** Hampton, Newport, Norton, Oak Grove, Oldwick, Palmyra, Palmyra Corners, Pattenburg,

Perryville, Pittstown, Pleasant Run, Polktown, Potterstown, Quakertown, Raritan Twp, Readington Twp); AND WARREN (Phillipsburg Twp) COUNTIES

	Rates	Fringes
Pipefitter.....	$ 36.91	21.04

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* ROOF0004-002 06/01/2002

ESSEX; HUDSON (West of the Hackensack River); MIDDLESEX (Remainder); MORRIS; SOMERSET (Remainder) SUSSEX; UNION; AND WARREN COUNTIES

	Rates	Fringes
Roofers:		
Roofer, Composition, Damp & Waterproofing, Slate & Tile	$ 29.57	12.75

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* ROOF0004-003 11/27/1994

HUNTERDON COUNTY:

	Rates	Fringes
Roofers:		
Shingle, slate and tile.....	$ 14.25	3.02
All other work.....	$ 21.95	6.53 + A

FOOTNOTE:
A. Employer contribution of $509.60 per month per employee to Health and Welfare Funds.

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* ROOF0008-004 07/01/2002

HUDSON COUNTY (Remainder)

	Rates	Fringes
Roofers:		
Roofers, Composition, Damp		

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9       and    Waterproofing........$ 30.08            18.78
0  ------------------------------------------------------------
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1  * ROOF0010-001 06/01/2004
2
3  BERGEN AND PASSAIC COUNTIES
4
5                                     Rates          Fringes
6
7    Roofer, Composition............$ 29.65            13.45
8  ------------------------------------------------------------
---
9  * SFNJ0669-001 04/01/2004
0
1  HUNTERDON; MIDDLESEX (Remainder); AND WARREN COUNTIES
2
3                                     Rates          Fringes
4
5    Sprinkler Fitter...............$ 35.55             6.15
6  ------------------------------------------------------------
---
7  * SFNJ0696-001 07/01/2002
8
9  BERGEN, ESSEX, HUDSON, MIDDLESEX (New Brunswick, Milltown,
Old
0  Bridge, Browntown and North thereof),MORRIS, PASSAIC,
SOMERSET
1  (Bernardsville, Basking Ridge, Mine Brook, Far Hills, Lyons,
2  Mount Bethel, Watchung, North Plainfield Martinville and
3  Somerville), AND  UNION COUNTIES
4
5                                     Rates          Fringes
6
7    Sprinkler Fitter...............$ 38.70            10.50
8  ------------------------------------------------------------
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9  * SHEE0019-014 06/01/2003
0
1  WARREN COUNTY:
2
3                                     Rates          Fringes
4
5    Sheet metal worker.............$ 24.57            17.09
6  ------------------------------------------------------------
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7  * SHEE0025-001 06/01/2000
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BERGEN, **ESSEX,** HUDSON, MORRIS, PASSAIC, SOMERSET, SUSSEX, & UNION COUNTIES

	Rates	Fringes
Sheet metal worker.....	$ 26.92	16.12

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* SHEE0027-001 01/01/2004

HUNTERDON & MIDDLESEX COUNTIES:

	Rates	Fringes
Sheet metal worker.....	$ 34.20	21.10

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* TEAM0408-001 05/01/1997

ESSEX, MORRIS, AND UNION (Remainder) COUNTIES

	Rates	Fringes
Truck drivers:		
GROUP 1.....	$ 24.45	7.01+A
GROUP 2.....	$ 24.50	7.01+A
GROUP 3.....	$ 24.60	7.01+A
GROUP 4.....	$ 24.70	7.01+A

FOOTNOTE:
A. Premium pay for hazardous waste removal: additional $3.00 per hour if suite-up, otherwise $1.00 per hour additional.
Paid Holidays: **New** Year's Day, Washington'd Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day, provided the employee has been assigned to work or "shifts" one day of the calendar week during which the holiday falls.
Employer contribution of $663.57 per month per employee to Health & Welfare Funds.

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1: Drivers on the following type vehicles: Straight dumps, flats, floats, pickups, container haulers, fuel,

water sprinkler, road oil, stringer, bead, hot pass, bus dumpcrete, transit mixers, agitator mixer, half truck, witch truck, side-o-matic, dynamite, powder, x-ray, welding, skid, jeep, station wagon, stringer, a-frame, all dual purpose trucks, trucks with mechanical tailgates, asphalt distributor, batch trucks, seeding, mulching, fertilizer, air compressor trucks (in transit), parts chaser, escort, scissor, hi-lift, telescope, concrete breaker, gin pole, stone, sand, asphalt distributor and spreader, nipper, fuel trucks (drivers on fuel trucks including handling of hose and nozzle - entire unit), team drivers, vacuum or vac-all trucks (entire unit), skid truck (debris container - entire unit), concrete mobile trucks (entire unit), expediter (parts chaser), beltcrete trucks, pumpcrete trucks, line truck, reel truck, wreckers, utility trucks, tack trucks, warehousemen, warehouse parts-men, yardmen, lift truck in warehouse, warehouse clerk, parts man, material checker, receivers, shippers, binning men (materials), cardex man, drivers on the following type vehicles: broyhill coal tar epoxy trucks, little ford bituminous distributor, slurry seal truck or vehicle, thiokol track master pickup (swamp cat pickup); bucker loader dump truck and any rubber-tired tractor used in pulling and towing farm wagons and trailers of any description, similar type vehicles, off-site and on-site repair shop

GROUP 2: Drivers on straight 3-axle materials: trucks and floats

GROUP 3: Drivers on all euclid type vehicles: euclids, international harvestors, wabcos, caterpillar, koehring, tractors and wagons, dumpsters, straight, bottom, rear and side dumps, carry-alls and scrapers (not self-loading, loading over the top); water sprinkler trailers; water pulls and similar types of vehicles; drivers on tractors and trailer type vehciles: flat, floats, I-beams, low beds, water sprinkler, bituminous transit mix, road oil, fuel, bottom dump hopper, rear dump, office, shanty, epoxy, asphalt, agitator mixer, mulching, stringer, seeding, fertilizing pole, spread, bituminous distributor, water pulls (entire unit) (tractor trailer), reel trailer, and similar types of vehicles

GROUP 4: Winch trailer drivers

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9 * TEAM0469-001 05/01/2000
0
1 HUNTERDON, MIDDFLESEX, SOMERSET, UNION (up to Wood Avenue
South
2 of Cranford), AND WARREN COUNTIES
3
4 Rates Fringes
5
6 Truck drivers:
7 GROUP 1.....$ 26.35 11.835+A
8 GROUP 2.....$ 26.40 11.835+A
9 GROUP 3.....$ 26.50 11.835+A
0 GROUP 4.....$ 26.60 11.835+A
1
2 FOOTNOTE:
3 A. PAID HOLIDAYS: **New** Year's Day, Memorial Day,
Independence
4 Day, Labor Day, Thaknsgiving Day, Christmas Day, plus
5 Washington's Birthday, Election Day and Veteran's Day,
6 provided that the employee has been assigned to work or
7 "SHIFTS" one day of the calendar week during which the
8 holiday falls.
9 $400.00 per year to Apprenticeship Training Fund.
0 $3.00 per hour premium pay for hazardous waste work.
1
2 TRUCK DRIVERS CLASSIFICATIONS
3
4 GROUP 1: Drivers on the following type vehicles: straight
5 dumps, flats, floats, pickups, conatiner haulers, fuel,
6 water sprinkler, road oil, stringer, bead, hot pass, bus
7 dumpcrete, transit mixers, agitator mixer, half truck,
8 winch truck, side-o-matic, dynamite, powder, x-ray,
9 welding, skid, jeep, station wagon, stringer, A-frame, all
0 dual purpose trucks, trucks with mechanical tailgates,
1 asphalt distributor, batch trucks, seeding, mulching,
2 fertilizer, air compressor trucks (in transit), parts
3 chaser, escort, scissor, hi-lift, telescope, concrete
4 breaker, gin pole, stone, sand, asphalt distributor and
5 spreader, nipper, fuel trucks (drivers on fuel trucks
6 including handling of hose and nozzle - entire unit), team
7 drivers, vacuun or vac-all trucks (entire unit), skid truck
8 (debris contained - entire unit), concrete mobile trucks
9 (entire unit), expediter (parts chaser), beltcrete trucks,
0 pumpcrete trucks, line truck, reel truck, wreckers, utility

trucks, tack trucks, warehousemen, warehouse parts-men, yardmen, lift truck in warehouse, drivers on the following type vehciles: Broyhill coal tar epoxy trucks, little ford bituminous distributor, slurry seal truck or vehicle, thiokol track master pickup (swamp cat pickup); bucket loader dump truck and any rubber-tired tractor used in pullind and towing farm wagons and trailers of any description, similar type vehicles, off-site and on-site repair shop

GROUP 2: Drivers on straight 3-axle materials: trucks and floats

GROUP 3: Drivers on all euclid type vehicles: euclids, international harvesters, wabcos, caterpillar, koehring, tractors and wagons, dumpsters, straight, bottom, rear and side dumps, carry-alls and scrapers (not self-loading, loading over the top); water sprinkler trailers; water pulls and similar types of vehicles; drivers on tractors and trailer type vehicles: flat, floats, I-beams, low beds, water sprinkler, bituminous transit mix, road oil, fuel, bottom dump hopper, rear dump, office, shanty, epoxy, asphalt, agitator mixer, mulching, stringer, seeding, fertilizing pole, spread, bituminous distributor, water pulls (entire unit) (tractor trailer), reel trailer, and similar types of vehciles

GROUP 4: Winch trailer drivers

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* TEAM0560-001 05/01/1997

BERGEN, HUDSON AND PASSAIC COUNTIES

	Rates	Fringes
Truck drivers:		
GROUP 1	$ 24.45	8.08+A
GROUP 2	$ 24.50	8.08+A
GROUP 3	$ 24.60	8.08+A
GROUP 4	$ 24.70	8.08+A

FOOTNOTE:

A. PAID HOLIDAYS:**New** Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Presidential

Election Day, Veteran's Day, Thanksgiving Day, Christmas Day.$3.00 per hour premium pay for hazardous work.

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1: Drivers on the following type vehicles: straight dumps, flats, floats, pickups, container haluers, fuel, water sprinkler, road oil, stringer, bead, hot pass, bus dumpcrete, transit mixers, agitator mixer, half truck, winch truck, side-o-matic, dynamite, powder, x-ray, welding, skid, jeep, station wagon, stringer, A-frame, all dual purpose trucks, trucks with mechanical tailgates, asphalt distributor, batch trucks, seeding, mulching, fertilizer, air compressor trucks (in transit), parts chaser, escort, scissor, hi-lift, telescope, concrete breaker, gin pole, stone, sand, asphalt distributor and spreader, nipper, fuel trucks (drivers on fuel trucks including handling of hose and nozzle - entire unit), team drivers, vacuum or vac-all trucks (entire unit), skid truck (debris container - entire unit), concrete mobile trucks (entire unit), expediter (parts chaser), beltcrete trucks, pumpcrete trucks, line truck, reel truck, wreckers, utility trucks, tack trucks, warehousemen, warehouse parts-men, yardmen, lift truck in warehouse, warehouse clerk, parts man, material checker, receivers, shippers, binning men (materials), cardex man, drivers on the following type vehicles: broyhill coal tar epoxy trucks, little ford bituminous distributor, slurry seal truck or vehicle, thiokol track master pickup (swamp cat pickup); bucket loader truck and any rubber- tired tractor used in pulling and towing farm wagons and trailers of any description, similar type vehicles, off-site and on-site repair shop

GROUP 2: Drivers on straight 3-axle materials: trucks and floats

GROUP 3: Drivers on all euclid type vehicles: euclids, international harvestors, wabcos, caterpillar, keohring, tractors and wagons, dumpsters, straight, bottom, rear and side dumps, carry-alls and scrapers (not self-loading, loading over the top); water sprinkler trailers; water pulls and similar types of vehicles; drivers on tractors and trailer type vehicles: flat, floats, I-beams, low beds, water sprinkler, bituminous transit mix, road oil, fuel, bottom dump hopper, rear dump, office, shanty, epoxy, asphalt, agitator mixer, mulching, stringer, seeding,

fertilizing pole, spread, bituminous distributor, water pulls (entire unit) (tractor trailer), reel trailer, and similar types of vehicles

GROUP 4: Winch trailer drivers

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

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

Branch of **Construction** Wage Determinations

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

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

Wage and Hour Administrator

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative

Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

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

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END OF GENERAL DECISION

Section 00100 Instructions to Bidders

For the work occurring in the eastern and western wetland areas, bidders will be required to submit with their proposal, under oath, a Statement of Qualifications (SOQ). Bidders failing to submit a SOQ with their proposal will be disqualified. In addition, in order for Bidders to become familiar with the existing conditions at the site, it is recommended that a site visit to the eastern and western wetland areas be made prior to submitting bids.

The SOQ shall include detailed documentation and resumes demonstrating the Bidder's prior relevant experience and its organization's ability to complete the Project. The SOQ shall conform to the following minimum requirements:

1) Related Project Experience
   For the work occurring in the eastern and western wetland areas, the Bidder shall provide a description of at least 3 related Projects, at least 2 acres in size and occurring within the last 7 years, in which the Bidder (or its subcontractor) has used excavators within a marsh environment subject to tidal inundation. The description must include:
   - summary of work performed, acreage, and location;
   - Project cost; and
   - client references (including contract, name, address, phone number).
2) Organization Chart and Resumes
   Provide an organization chart of key Project personnel, including Project Manger and Site Supervisor. Provide resumes of key personnel.

3) Subcontractor's SOQ
   Provide a list of subcontractors with associated Project experience, references, and resumes of key personnel.

Company brochures alone shall not be submitted for the purpose of demonstrating experience and technical expertise. The Government reserves the right at any time to require a Bidder to submit such additional evidence of their qualifications as it may deem necessary and may consider any evidence available to it of the financial, technical, and other qualifications and abilities of the Bidder.

Determinations as to the Bidder's qualifications are reserved to the discretion of the Government. If it is to be awarded, the Contract will be awarded to the lowest responsible Bidder who, in the sole determination of the Government, is fully qualified to undertake the Project and whose proposal conforms in all aspects to the requirements set forth in the Contract Documents.

SECTION 00800

SPECIAL CONTRACT REQUIREMENTS

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52. Statement of Qualifications

1. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK

a. The Contractor shall be required to (1) commence work under this contract within 5 calendar days after the Contractor receives the Notice to Proceed, (ii) prosecute the work diligently, and (iii) complete the entire work ready for use, not later than 548 calendar days after the day the contractor receives the Notice to proceed. The Optional Bid Items, if awarded, would be awarded as follows:

- Option 1 to be awarded within 456 calendar days after the Base Bid Notice to proceed and be completed within 548 days from the Notice to Proceed for the Option.

- Option 2 to be awarded within 365 calendar days after the Base Bid Notice to proceed and be completed within 548 days from the Notice to Proceed for the Option.

- Option 3 to be awarded within 245 calendar days after the Base Bid Notice to proceed and be completed within 183 days from the Notice to Proceed for the Option.

- Option 4 to be awarded within 245 calendar days after the Base Bid Notice to proceed and be completed within 183 days from the Notice to Proceed for the Option.

- Option 5 to be awarded within 365 calendar days after the Base Bid Notice to proceed and be completed within 274 days from the Notice to Proceed for the Option.

The time stated for completion shall include final cleanup of the premises.

b. Location: The site of work is along the Passaic River in the City of Newark, New Jersey.

c. The Contractor shall furnish all labor, materials, equipment and services (except those furnished by the Government) for the following work:

Construction of a new bulkhead and related work, outfall structures and drainage outlets, restoration of the river bank, and restoration of tidal wetlands.

d. All work shall be in accordance with the drawings and specifications or instructions attached hereto and made a part thereof, or to be furnished hereafter by the Contracting Officer and subject in every detail to his supervision, direction, and instructions.

e. Magnitude of Construction Project: The estimated value of the work is between $10,000,00 and $15,000,000.

2. LIQUIDATED DAMAGES - CONSTRUCTION (APR 1984)

a. If the Contractor fails to complete the work within the time specified in the Contract, or any extension, the Contractor shall pay

to the Government as liquidated damages, the sum of $630 for each day of delay.

b. If the Government terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

c. If the Government does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted. (FAR 52.212-5)

d. At a time before the project is physically complete but is functionally complete to the satisfaction of the Government, the Government at its sole discretion may agree to accept transfer of the facility or project provided that the remaining work to be done ("punchlist") is completed no later than 30 days from the date of transfer. In this case the Contractor shall pay liquidated damages for punchlist items not completed in the daily amount of $100 per day commencing after 30 days of project transfer or after date required for project completion (including all extensions), whichever occurs later.

3. EQUAL OPPORTUNITY PREAWARD CLEARANCE OF SUBCONTRACTS (1984 APR)

Notwithstanding the clause of this contract entitled "Subcontracts" the Contractor shall not enter into a first-tier subcontract for an estimated or actual amount of $1 million or more without obtaining in writing from the Contracting Officer a clearance that the proposed subcontractor is in compliance with the equal opportunity requirements and therefore is eligible for award.

4. CERTIFICATES OF COMPLIANCE

Any Certificates required for demonstrating proof of compliance of materials with specification requirements shall be executed in 4 copies. Each certificate shall be signed by an official authorized to certify in behalf of 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. (ECI 7- 670.3)

5. BID GUARANTEE

See Bid Guarantee Clause of Section 00700, CONTRACT CLAUSES.

6. CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (52.236-7001)

See Contract Drawings, Maps and Specifications Clause of Section 00700, CONTRACT CLAUSES. For list of drawings see Index of Drawings.

7. RECORD DRAWINGS

a. General: The Contractor will maintain as-built drawings during the construction period and will submit final record drawings at the completion of individual facilities. The Government will provide to the Contractor the CAD (Computer-Aided Drafting) files consisting of compact (computer) disks or magnetic media of the drawing files in the appropriate CAD format (i.e. "Microstation", "Autocad", etc.) for the project. The Contractor is required to make prints or mylars from the CAD files and continuously maintain drawings to show current as-built conditions for the duration of the construction. Except for updates as indicated below, the Contractor may maintain as-built drawings by marking up drawings by hand or by CAD methods. Scanned drawings will not be acceptable. If the Government cannot provide CAD files for the project drawings, mylar (reproducible) drawings will be provided. The contractor will then be required to comply with all requirements indicated herein by the use of hand drafting.

b. Progress As-built Prints: During construction the Contractor is responsible for maintaining up to date one set of paper prints to show as-built construction conditions. These prints shall be kept current and available on the job site 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 accordingly and neatly recorded as they occur by means of details and notes. The as-built prints will be jointly inspected for accuracy and completeness by the Contracting Officer's Representative and a responsible representative of the Contractor prior to submission of each monthly pay estimate. Progress as-builts shall show the following information, but not limited thereto:

(1) The location and description of any utility lines, valves, or other installations of any kind within the construction area. The location includes dimensions to permanent features.

(2) The location and dimensions of any changes with the building and structure.

(3) Correct grade or alignment of roads, structures or utilities if any changes were made from the contract plans.

(4) Correct elevations if changes were made in site grading

(5) 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 fabricated, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

(6) The topography and grades of all drainage installed or affected as part of the project construction.

(7) All changes, which result from contract modifications.

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

(9) All amendments to the contract drawings issued during the solicitation period shall be posted on the as-built drawings.

c. Hand Drafting: If mylars only are provided to the Contractor, they shall be updated using hand drafting. Only personnel proficient in the preparation of engineering drawings to standards satisfactory and acceptable to the Government shall be employed to modify the mylar reproduction drawings or prepare additional new drawings. All additions and corrections to the contract drawings shall be neat, clean and legible, and shall match the adjacent line work and/or lettering being annotated in type, density, size and style. All drafting work shall be done using the same medium (pencil, plastic lead or ink) that was employed on the original contract drawings and with graphic lead on paper base material. The title block to be used for any new as-built drawings shall be similar to that used on the original contract drawings.

d. Protection of Records: The Contractor shall be responsible for the protection and safety of mylars and CAD record until returned to the Contracting Officer. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at his expense.

e. 50% As-Built Update: At the 50% point in construction of this project (as determined by progress payments) the Contractor will update the CAD files of the project drawings in the appropriate CAD program to show as-built conditions as above, and submit an updated computer disk and one set of prints to the Contracting Officer for approval. If mylars only are provided to the Contractor, they shall be updated at this stage using hand-drafting as specified herein, and the Contractor shall submit one set of prints to the Contracting Officer for approval. Any required corrections will be made by the Contractor before payment will be approved for this item. The Contractor must use the updated CAD record or mylar drawings to produce required prints.

f. Preliminary Record Drawing Submittal: At least thirty calendar (30) days before the anticipated date of final acceptance inspection the Contractor shall deliver two copies of progress prints showing final as-built conditions to the Contracting Officer for review and approval. These prints shall correctly show all the features of the project as it has been constructed, adding such additional drawings as may be necessary. They shall be printed from the CAD files updated in the appropriate CAD program, or from updated mylars if mylars only were provided to the Contractor. Within ten days, the Government will provide the Contractor one set of prints indicating required corrections to the preliminary submittal. Contractor will correct and resubmit within 5 days. Any required subsequent review and resubmission periods will each be accomplished within 5 days. Upon Government approval of the preliminary submittal, the Contractor will prepare final record drawings.

g. Record Drawing Submission: In the appropriate CAD program each drawing shall be marked with the words "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in font which will print at least 3/16" high. All revisions to the original contract drawings will be dated in the revision block. All prints and mylars must be reproduced from the updated CAD files. If mylars only were provided to the Contractor, they shall be hand-lettered or stamped as indicated above, and revisions shown in revision block. A minimum of 5 calendar days before the anticipated date of final acceptance inspection of the project the Contractor shall deliver to the Contracting Officer:

Three (3) CD's (ROM) of CAD files of Record Drawings.
One (1) set of Mylar Record Drawings
One (1) copy of prints of Record Drawings.

Failure to make an acceptable submission of Record Drawings will delay the Final Acceptance Inspection for the project and shall be cause for withholding any payment due the Contractor under this contract..

h. Property: All paper prints, reproducible drawings and CAD files will become property of the Government upon final approval. Approval and acceptance of the final record drawings shall be accomplished before final payment is made to the Contractor.

i. Payment: No separate payment will be made for the as-built and record drawings or updating of CAD files required under this contract, and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor.

8. DESIGNATION OF PROPERTY ADMINISTRATOR

Not Used.

9. PHYSICAL DATA

Information and data furnished or referred to below are not intended representations or warranties but are furnished for information only. It is expressly understood that the Government will not be responsible for any deduction, interpretation, or conclusion drawn therefrom by the Contractor: (FAR 52.236-4) (APR 1984).

a. Survey and Subsurface Investigations: The physical conditions indicated on the Contract Drawings and the Specifications are the result of site investigations by survey and spoon sampling. While the Government's procedures for subsurface investigations may produce representative information at their respective locations, local variation characteristics of the subsurface materials of this region are to be expected. Should any question or discrepancy arise, the condition should be independently confirmed by the Contractor.

b. Transportation Facilities: Interstate 78, Interstate 95 and New Jersey State Route 21 are located in the vicinity of the Project

area. The Contractor shall make his own investigation of available roads for transportation, load limits of bridges and roads, and other road conditions affecting the transportation of materials, equipment, supplies and other facilities to the site. The Contractor shall also construct such temporary haul roads and bridges as may be necessary for the conduct of his work. Any such temporary construction shall be restored to its original condition at the completion of the Contract. All costs for the use of existing transportation facilities, for the construction of temporary facilities, and for maintenance, repair, removal and restoration shall be the responsibility of the Contractor.

c. Channel Traffic: Vessel traffic in the channels in the Project area consist of small coastal and harbor tankers, occasional tows of scows and barges, and pleasure fishing craft.

10. PAYMENT FOR MATERIALS DELIVERED OFF-SITE

Pursuant to the Contract Clauses in this contract titled "Payments Under Fixed-Price Construction Contracts", materials delivered to the Contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the Contract Clauses are fulfilled. Payment for items delivered to locations other than the work site will be limited to those materials which have been approved, if required by the technical provisions; those materials which have been fabricated to the point where they are identifiable to an item of work required under this contract. Such payment will be made only after receipt of paid or receipted invoices or invoices with cancelled check showing title to the items in the prime contractor and including the value of materials and labor incorporated into the item.

11. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

a. Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a Contractor or subcontractor at any tier shall be based on actual cost data when the government can determine both ownership and operating costs for each piece of equipment or equipment groups of similar serial and series from the Contractor's accounting records. When both ownership and operating costs cannot be determined from the Contractor's accounting records, equipment costs shall be based upon the applicable provisions of EP 1110-1-8,* "Construction Equipment Ownership and Operating Expense Schedule," Region 1. 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 or 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 retrospective pricing, the schedule in effect at the time the work was performed shall apply.

(* This manual can be ordered from the Government Printing Office by calling Tel. No. (202) 783-3238. There is a charge for the manual.)

b. Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36 substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated leases are allowable. Costs for major repair and overhaul are unallowable.

c. When actual equipment costs are proposed and the total amount of the pricing action is over $25,000, cost or pricing data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet." By submitting cost or pricing data, the Contractor grants to the Contracting Officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement the Contractor shall certify that the equipment costs or pricing data submitted are accurate, complete and current.

12. ALTERATIONS IN CONTRACT (APR 1984)

Portions of this contract are altered as follows:

Add the following sentence to paragraph "g" of basic contract clause, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (1984 APR):

"Upon completing the work under this contract, the Contractor shall furnish a complete set of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the equipment is completed and accepted."
Alt.1 (APR 1984)(FAR 52.236-21)

13. AVAILABILITY AND USE OF UTILITY SERVICES (APR 1984)

The responsibility shall be upon the Contractor to provide and maintain at his own expense adequate supply of electricity, water, and sanitary facilities for his use for construction purposes and the use of his construction forces and to install and maintain necessary supply connections for same, but only at such locations and in such manner as may be approved by the Contracting Officer's representative. All installations shall comply with all applicable codes, standards and requirements. Before final acceptance, temporary connections installed by the Contractor shall be removed in a manner satisfactory to the Contractor Officer.

14. LAYOUT OF WORK

a. The Contractor will establish at his own expense the base lines and bench marks at the site of the work: (Monuments and bench marks as shown in the specifications).

b. From the base lines and bench marks established, the Contractor shall complete the layout of 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, subject to such modifications as the Contracting Officer may require to meet changed conditions or as a result of necessary modifications to the contract work.

C. The contractor shall furnish, at his own expense, such stakes, templates, platforms, equipment, tools and material, and all labor as may be required in laying out any part of the work from the base lines and bench marks. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other marks established until authorized to remove them, and if such marks are destroyed by the Contractor, or through his negligence prior to their authorized removal, they shall be replaced by the Contractor, at his own expense, if directed by the Contracting Officer. The Contracting Officer may require that work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking of the work.

15. FIELD OFFICE

a. The Contractor shall furnish at the job site, prior to the start of work, a 30 feet by 15 feet field office with two (2) offices for the use by Government representatives for the duration of the contract. Field office and contents remain the property of the contractor. The exact location will be designated by the Contracting Officer. The building shall be well constructed and properly ventilated and shall contain a closet and door and windows which shall be capable of being locked, ten (10) new ergonomically- designed chairs, one (1) conference table that accommodates eight chairs, one (1) plan rack and drawing board, three (3) desks, and two (2) two-drawer filing cabinets. The Contractor shall also provide adequate electric lighting, minimum 6 duplex electrical receptacles, drinking water, heat, plumbed toilet facilities, air conditioning, janitorial services and maintenance services. In addition the contractor shall make arrangements and pay connection fees and monthly usage for electrical and 3-line telephone service (fax, modem and voice). The field office shall be removed from the project site when and as directed by the Contracting Officer. In addition to the above, the Contractor shall provide the following computer and office equipment, and other items for use by the Government during the contract:

Hardware:

Personal Computer:

· Pentium IV processor running at 2.4 GHz or better
· High speed cache memory controller with at least 512 KB L2 PIPELINE BURST CACHE
· At least 512 MB SDRAM
· (1) 3.5" 1.44 MB diskette drives with hard drive controller
· Hard drive controller with 40 GB hard drive and with access time of 9 ms
· Sound Card WI SPEAKERS

· Enhanced 101 keyboard
· 6 outlet surge protector
· 17" Flat Panel SVGA high resolution COLOR monitor with refresh rate 75
Hz or better and 8 MB Color Graphics
· 3 Buttons ergonomic mouse and mouse pad
· Modem V.90 or V.92 56 KB Baud (U.S. Robotics or equal)
· Internal DVD ROM 16X and CD-RW(Read/Write) Drive 24X
· Microsoft Windows 2000 Professional Operating System
· Microsoft Office 2000 Professional Suite or latest version
· Lotus Smart Suite and Adobe Acrobat Reader
· Signature card reader: Gradkell Computer Inc. Part # 050-0300
Description: Argus 300 (card reader and PCI adapter package) for CEFMS.
Phone No.: (256) 722-8585 x37 (Mr. Wayne Wright).
. Norton Antivirus Software 2002 and periodic updates.
· Printer: Hewlett Packard Laserjet 4100 Series Printer or equivalent
Laserjet Printer.
Copier: Plain-paper, desktop, autofeed, monochrome, 10 copies per minute.

Webcamera: Compatible, portable webcamera, to be used to view constraction progress.

Fax Machine: Monochrome, minimum feed (3) - 8 1/2x11 inch pages per minute. Capable of receiving on plain white bond paper.

Telephones: Two (2) separate 2-Line phones compatable with phone service. One installed in each office of the office trailer.

Telephone Answering Machine: Standard, compatable with standard telephone line and local service.

Wireless Telephone: The Contractor shall provide wireless telephone and service for the duration of the contract. The telephone shall include a "hands-free" device to be used while driving. The service provider shall be approved by the COR.

First Aid Kit: As a minimum the kit will include antiseptic kit, eyewash solution, bandages, insect sting medication, aspirin and acetaminophen, and coldpack.

Fire Extinguisher: Type as required for a trailer the same size as office.

Digital Camera: The digital camera shall be a Kodak DC260 or equal with carrying case and supporting software, capable of running on the Contractor supplied personal computer.

b. The Contractor, at his option, may furnish a trailer with equivalent square footage, not less than 20 feet long. The trailer shall be approved by the Contracting Officer and shall have the facilities and be serviced as specified above for the field office.

c. No separate payment will be made for providing the above items

and all costs in connection therewith will be considered the obligation of the Contractor.

Computer Security Requirements:

The Contractor will agree to accept responsibilities and comply with procedures indicated below in connection with the furnishing of Contractor-owned computers for use by Government personnel in accordance with contract requirements.

a. The computers must be dedicated exclusively for Government use. Contractor will not use any computer it supplies which is designated for use by the Government. Contractor will assure that the Central Processing Unit (CPU) is electronically isolated from the Contractor's and not inter-connected via Local Area Network (LAN).

b. Normal access to the computer shall be restricted to Corps of Engineers personnel. The Contractor shall supply a separate lockable trailer where the computers are to be set up. The Contractor must immediately notify Government personnel when emergency access to the trailer was exercised by non-Government individuals, and what the circumstances were.

c. If the CPU hard drive fails, the Government will furnish an equivalent hard drive to the owner of the computer, and the old hard drive will b returned to the Government. The Contractor shall not remove any hard drive nor proceed with any repair of the computer unless an authorized Government employee witnesses and approves of the repair.

d. At the time of return of the computer, the Contractor will allow the Government to first remove all information from the hard drive.

e. The Contractor agrees to provide a written certification signed by an authorized officer of the company agreeing to the above policy.

16. BULLETIN BOARD

Immediately upon beginning of work under this contract, the Contractor
shall provide at the job site a weatherproof glass-covered bulletin board for displaying the fair employment poster, wage rates, and safety bulletins and posters. Emergency telephone numbers and reporting instructions for ambulance, physician, hospital, fire and police shall be posted. The bulletin board shall be located in a conspicuous place easily accessible to all and legible copies of the aforementioned data shall be displayed until work under the contract is completed. No direct payment will be made for the bulletin board.

17. QUANTITY SURVEYS (APR 1984)

Not used.

18. SUPERINTENDENCE OF SUBCONTRACTORS (JAN 1965)

a. The Contractor shall be required to furnish the following, in addition to the superintendence required by the Contract Clause titled, "SUPERINTENDENCE BY THE CONTRACTOR".

(1) If more than 50% and less than 70% of the value of the contract work is subcontracted, one superintendent shall be provided at the site and on the Contractor's payroll to be responsible for coordinating, directing, inspecting and expediting the subcontract work.

(2) If 70% or more of the value of the work is subcontracted, the Contractor shall be required to furnish two such superintendents to be responsible for coordinating, directing, inspecting and expediting the subcontract work.

b. If the Contracting Officer, at any time after 50% of the subcontracted work has been completed, finds that satisfactory progress is being made, he may waive all or part of the above requirement for additional superintendence subject to the right of the Contracting Officer to reinstate such requirement if at any time during the progress of the remaining work he finds that satisfactory progress is not being made. (DoD FAR Supplement 52.236-7008)

19. SCHEDULING AND DETERMINATION OF PROGRESS

Pursuant to the Contract Clause, SCHEDULES FOR CONSTRUCTION CONTRACTS, the Contractor shall prepare and submit for approval a practicable project schedule. The type of schedule and detailed requirements as well as timing of this submittal shall be as specified in specification section "PROJECT SCHEDULE".

This schedule will be the medium through which the timeliness of the Contractor's construction effort is appraised. When changes are authorized that result in contract time extensions, Contractor shall submit a modified schedule for approval by the Contracting Officer.

The terms of Contract Clause, SCHEDULES FOR CONSTRUCTION CONTRACTS, with reference to overtime, extra shifts, etc., may be invoked when the Contractor fails to start or complete work features or portions of same by the time indicated by the milestone dates on the approved project schedule, or when it is apparent to the Contracting Officer from the Contractor's actual progress that these dates will not be met.

Neither on the project schedule as originally submitted nor on any updated periodic schedules which the Contractor is required to prepare and submit, shall the actual progress to be entered include or reflect any materials which even though on the site, are not yet installed or incorporated in the work. For payment purposes only, an allowance will be made by the Contracting Officer of up to 100 percent of the invoiced cost of materials or equipment delivered to the site but not incorporated into the construction, pursuant to Contract Clauses, PAYMENT UNDER FIXED- PRICE CONSTRUCTION CONTRACTS. The making of such an allowance will be contingent upon a determination by the Contracting

Officer that the Contractor's compliance with the quality control requirements of the contract is more than satisfactory.

20. PROCEDURES FOR SUBMISSION AND PAYMENT OF ALL CONTRACT PAYMENTS

In addition to the requirements contained in the Contract Clause entitled "PAYMENTS UNDER FlXED-PRICE CONSTRUCTION CONTRACTS" and to implement the requirements of the Prompt Payment Act Amendments of 1988, P.L. 100-496, the following shall apply to all payments made under this contract:

a. At the time of submission of the progress chart, the contractor shall submit for approval by the Contracting Officer or his authorized representative a breakdown of the contract work which shall be to the degree of detail required by the Contracting Officer or his representative to effect reasonable progress payments. The Contracting Officer or his representative shall review this breakdown within 30 calendar days after receipt and either advise the contractor that it is approved or disapproved, and if disapproved the reasons for disapproval. Only after the breakdown is approved shall any payment invoice be accepted from the contractor and any payment made to him. The Contracting Officer can determine if it is in the best interest of the Government to make payment without an approved breakdown, however, in no case shall more than 10% of the contract amount be paid unless the breakdown is approved.

b. The contractor shall submit his request for payment by submission of a proper invoice to the office or Person(s) designated in subparagraph (c). For purposes of payment a "proper invoice" is defined as the following:

(1) An estimate of the work completed in accordance with the approved breakdown indicating the percentage of work of each item and the associated costs.

(2) A properly completed Eng Form 93 and 93a (where required).

(3) All contractual submissions indicated elsewhere in this contract to be submitted with payment, such as updated progress schedules, updated submittal registers, etc.

(4) The following certification executed by a responsible official of the organization authorized to bind the firm. A "responsible official" would be either a corporate officer, partner, or owner, in the case of a sole proprietorship

I hereby certify, to the best of my knowledge and belief, that --

(a) The amounts requested are only for performance in accordance with the specifications, terms and conditions of the contract;

(b) Payments to subcontractors and suppliers have been made from previous payments received under the contract and timely payments will be made from the proceeds of the payment

covered by this certification, in accordance with subcontract requirements and the requirements of chapter 39 of Title 31, United States Code; and

(c) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

(d) All required prime and subcontractor payrolls have been submitted.

_____
(Name)

_____
(Title)

_____
(Date)

c. The Government shall designate the office or person(s) who shall first receive the invoice submissions and the Contractor shall be so notified at the preconstruction conference. In addition to the designated Project Engineer, the Contractor shall at the same time submit one copy of the detailed breakdown and the Eng Form 93 and 93a Form to the Area Engineer.

d. The Government representative shall return any request for payment which is deemed defective within 7 days of receipt and shall specify the defects. If the defect concerns a disagreement as to the amount of work performed and/or the amount of the payment being submitted, the Government and the contractor's representative should meet to resolve the differences and reach agreement. Upon agreement, the contractor shall submit a new breakdown and Eng Form 93 (and 93a) and any other submissions requiring correction. These will be incorporated with the previous submittal and will then constitute a proper invoice.

e. If agreement cannot be reached, the Government shall determine the proper amount per Contract Clause, PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS and process the payment accordingly. In this event, a "proper invoice" for Prompt Payment Act purposes will not have been submitted to the Government.

f. The Government shall pay the contractor in accordance with the following time frames:

(1) Progress Payments - From the date a "proper invoice" is received, in accordance with subparagraphs b and d of this clause, the Government will issue a check within 14 calendar days.

(2) Reduction in Retainage Payment. If during the course of the contract, a reduction in retainage payment is required, the Government shall issue a check within 30 calendar days after the approval of the

release to the contractor by the Contracting Officer or his authorized representative.

(3) Final Payment. A final payment request shall not be considered valid until the contractor has fulfilled all contract requirements including all administrative items, payrolls, warranties, etc. and has submitted a release of claims. When the contractor has fulfilled all contract requirements and a "proper invoice" has been submitted, the Government shall issue a check within 30 days from the date of acceptance of the project by the Contracting Officer.

21. PAYMENT FOR MOBILIZATION AND PREPARATORY WORK (JAN 1997)

Not Used

22. SUBMISSION OF CLAIMS

The following shall be submitted to the Contracting Officer at the following address: U.S. Army Corps of Engineers, New York District, 26 Federal Plaza, New York, New York 10278-0090:

a. claims referencing or mentioning the Contracting Disputes Act of 1978
b. requests for a written decision by the Contracting Officer
c. claims certified in accordance with the Contract Disputes Act of 1978

No other Government representative is authorized to accept such requests. A copy shall also be provided to the Authorized Representative of the Contracting Officer.

The Contractor shall also provide the Contracting Officer with a copy of any requests for additional time, money or interpretation of contract requirements which were provided to the Authorized Representative of the Contracting Officer and which have not been resolved after 90 days.

23. PROGRESS PAYMENTS

Progress Payments made pursuant to the PAYMENTS TO CONTRACTOR clause for any item of work in the bid schedule shall be based on the contract unit price or lump sum amount set forth in the bid schedule for that item of work. If the amount of the unit price or lump sum bid for any item of work is in excess of 125% of the Government estimate for such item, the Contracting Officer may require the contractor to produce cost data to justify the price of the bid item. Failure to justify the bid item price to the satisfaction of the Contracting Officer may result in payment of an amount equal to 125% of the Government estimate for such bid item upon completion of work on the item and payment of the remainder of the bid item price upon final acceptance of all contract work.

24. PERFORMANCE EVALUATION OF CONTRACTOR (1985 JAN HQ USACE)

As a minimum, the Contractor's performance will be evaluated upon final acceptance of the work. However, interim evaluation may be prepared at any time during contract performance when determined to be in the best interest of the Government.

The format for the evaluation will be SF 1421, and the Contractor will be rated either outstanding, satisfactory, or unsatisfactory in the areas of Contractor Quality Control, Timely Performance, Effectiveness of Management, Compliance with Labor Standards, and Compliance with Safety Standards. The Contractor will be advised of any unsatisfactory rating, either in an individual element or in the overall rating, prior to completing the evaluation, and all contractor comments will be made a part of the official record. Performance Evaluation Reports will be available to all DoD Contracting Officers for their future use in determining Contractor responsibility, in compliance with DFARS 36.201(c)(1).

25. SAFETY AND HEALTH REQUIREMENTS MANUAL

The Contractor shall comply with all pertinent provisions of the latest edition of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385- 1-1, in effect on the date of the solicitation. The latest edition, as referenced in the Accident Prevention Clause of the CONTRACT CLAUSES, is dated November 2003. Changes of EM 385-1-1 are available at http://www.hg.usace.army.mil (at the HQ homepage, select Safety and Occupational Health). The Contractor shall be responsible for complying with the current edition and all changes posted on the web as of the effective date of this solicitation.

Before commencing the work, the Contractor shall - (1) Submit a written proposal for implementing the Accident Prevention Plan; and (2) Meet with representatives of the Contracting Officer to discuss and develop a mutual understanding relative to administration of the overall safety program.

26. AUTHORIZED CONSTRUCTION AREA AND TRESPASSING

The Contractor shall not inflict damage upon land and properties outside the authorized construction area by unwarranted entry upon, passage through, damage to, or disposal of, material on such land or property. The Contractor may make a separate agreement with any other party, regarding the use of, or right to, land or facilities outside the contract area. If such an agreement is made, it shall be in writing and a copy shall be furnished the Contracting Officer. The Contractor shall hold and save the Government, its officers, and agents free from liability of any nature or kind arising from any trespassing or damage occasioned by his operations.

27. DAMAGE TO WORK

The responsibility for damage to any part of the permanent work shall be as set forth in the article of the contract clause entitled "PERMITS AND RESPONSIBILITIES". However, if in the judgment of the Contracting Officer, any part of the permanent work performed by the Contractor is damaged by flood, earthquake, hurricane, severe coastal storm or tornado, 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 Contract Clause entitled CHANGES, will be made as full compensation for the repairs of that part of the permanent work for which there are not applicable contract unit or lump-sum prices. Except as herein provided, damage to all work, utilities, materials, equipment, and plant, including temporary construction and utilities, pavements, and other property along the routes used by the Contractor's pipelines and/or land vehicles, shall be repaired to the satisfaction of the Contracting Officer, the State of New Jersey, and the utilities companies, at the contractor's expense regardless of the cause of such damage.

28. ENVIRONMENTAL LITIGATION (1974 NOV) (OCE)

a. 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 this contract. 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.

b. 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. (ECI 7-671.10)

29. LABOR-ADDITIONAL REQUIREMENTS

Fringe benefits statement: The method of payment of applicable fringe benefits will be indicated on DD Form 879, Statement of Compliance, and attached to each weekly payroll.

30. CRANE AND DRAGLINE SAFETY REQUIREMENTS

In addition to meeting all applicable requirements of OSHA standards and Section 16 of the U. S. Corps of Engineers Manual, "Safety and Health Requirements", EM 385-1-1, dated 3 September 1996, all cranes used in performing the work set forth in these specifications shall be equipped with geared boom hoists or otherwise provided with mechanisms which will prevent the booms from failing free. Cranes that are equipped with booms that can be lowered either by gravity or by power shall have the mechanisms for operating the booms by gravity made inoperative so that the booms cannot be lowered by gravity. The booms of all cranes and draglines shall also be equipped with shock absorbing type back stops to prevent them from overtopping.

All cranes shall have a red strobe light and two flags attached to the end of the boom. The flags shall be 18-inches square and international orange in color. The strobe does not need to be flashing during daylight hours or when the boom is lowered to the ground at night. The strobe shall be flashing when operating during weather in which visibility is reduced or when operating at night. The strobe shall remain flashing if the boom remains elevated at night.

Cranes may only be operated by qualified operators. Proof of qualification shall be in writing. Crane Operators shall be designated by a source which qualifies crane operators (see EM 385-1-1, paragraph 16.C.04 and 16.C.05).

31. SIGNAL LIGHTS

The Contractor shall display signal lights and conduct his operations in accordance with the General Regulations of the Department of the Army and of the Coast Guard governing lights and day signals to be displayed by towing vessels with tows on which no signals can be displayed, vessels working on wrecks, dredges, and vessels engaged in laying cables or pipe or in submarine or bank protection operations, lights to be displayed on dredge pipe lines, and day signals to be displayed by vessels of more than 65 feet in length moored or anchored in a fairway or channel, and the passing by other vessels of floating plant working in navigable channels, as set forth in Commandant U.S. Coast Guard Instruction M16672.2, Navigation Rules: International-Inland (COMDTINST M16672.2), or 33 CFR 81 Appendix A (International) and 33 CFR 84 through 33 CFR 89 (Inland) as applicable.

32. ACCESS AREA

Areas designated on the drawings as "Access to Work Area" shall be used by the Contractor solely for the purpose of access to and from the

"Work Limits". The Contractor shall arrange his use of these access areas so as to minimize interference with the property owners' (or user's) access or normal use.

33. TIME EXTENSIONS (APR 1984)

a. Notwithstanding any other provisions of this contract, it is mutually understood that the time extensions for changes in the work will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements so delayed and that the remaining contract completion dates for all other portions of the work will not be altered and may further provide for an equitable readjustment of liquidated damages under the new completion schedule. (FAR 52.211-13)

b. Time Extensions for Unusually Severe Weather.

(1) This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with 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.

(2) 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
(7)	(6)	(7)	(5)	(6)	(5)	(6)	(5)	(5)	(4)	(4)	(6)

(3) 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 2, 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)".

34. VEHICULAR AND OTHER TRAFFIC CONTROL

The Contractor shall be required to provide and maintain barriers, flagmen and warning devices during construction and hauling operations which may interfere with vehicular and other traffic. The Contractor shall also be required to effect necessary traffic control as required by the appropriate agencies. All safety precautions shall be subject to the approval of the Contracting Officer.

35. STORAGE AREAS

The Contractor may store his required materials and equipment within the "Work Limits" shown on the drawings. No storage will be allowed outside the designated work limits. The Contractor may make his own arrangements with parties or agencies involved for storage areas outside the work limits.

36. CONTRACTOR'S AREA USE PLAN

Not Used.

37. VERIFICATION OF SMALL BUSINESS UTILIZATION

a. This clause is applicable to small business concerns whose contracts exceed $1,000,000.

b. In accordance with the clause at FAR 52.219-8, entitled UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS, in effect on the date of this contract, the Contracting Officer may survey the extent of small and small disadvantaged business utilization under this contract. The Contractor may be required to report to the Contracting Officer statistical data on the number and dollars amounts of subcontracting awards with small businesses and small disadvantaged businesses.

c. As appropriate, the Contracting Officer may require one or more follow-up reports to the initial report.

d. The Contractor agrees to insert this clause in any subcontract that may exceed $1,000,000, including this subparagraph (d).

38. PRECONSTRUCTION CONFERENCE

a. A pre-construction conference will be arranged by the Contracting Officer, or his Representative, after award of contract and before commencement of work. The Contracting Officer's representative will notify the Contractor of the time and date set for the meeting. At this conference the Contractor will be oriented with respect to Government procedures and line of authority, contractual, administrative, and construction matters. Additionally, a schedule of required submittals will be discussed.

b. The Contractor shall bring to this conference the following items in either completed or draft form:

- The Contractor's order of work.
- Accident Prevention Plan. (See Accident Prevention Clause in Section 00700 and paragraph 25 of this Section concerning Safety and Health Requirements Manual)
- Quality Control Plan. (See Section 01451)
- Letter appointing Superintendent.
- List of subcontractors, if any.

39. COORDINATION CONFERENCES

Routine coordination conferences will be scheduled by the Contracting Officer throughout the life of this contract. Coordination conferences will be held to discuss contract administration, Contractor quality control, phasing, scheduling, and other aspects relating to this construction. The Corps of Engineers and the Contractor will be represented at each of these meetings. Similar information concerning replacement personnel shall be forwarded to the Contracting Officer, should any replacement be required at any time during the life of this contract. Coordination conferences will be scheduled to occur on a weekly basis.

40. CONTRACTOR WORKING HOURS

Unless specifically authorized by the Contracting Officer, contract work shall be restricted to the hours of 7:00 A.M. to 6:00 P.M., Mondays through Saturdays. No work will be permitted on Sundays and Federal and State legal holidays. The Contractor shall comply with paragraph 01.c.04 of EM 385-1-1, the U.S. Army Corps of Engineers Safety and Health Requirements Manual, in effect on the date of this solicitation.

41. PARTNERSHIP IMPLEMENTATION PLAN

To more effectively accomplish this contract, the Government proposes to form a partnership with the Contractor. This partnership would draw on the strengths of each organization in an effort to achieve a quality product within budget and on schedule. This partnership would be bilateral in make-up and participation would be required. The Contractor shall retain the services of a facilitator with experience as a Partnering Consultant. The facilitator

satisfactory to both parties shall be hired who would be responsible to arrange for an offsite location, provide all workshop materials, and compile and distribute a completed partnering agreement to all participants within 30 days of the partnering session. Conference site location will be coordinated with the Contracting Officer for approval. Contractor should plan for the attendance of approximately 10-12 individuals from the Government, 5-7 representatives from the City of Newark, 3-5 individuals from the State of New Jersey, in addition to the Contractor's and Sub-contractor's personnel. All costs associated with partnership implementation will be borne by the Contractor. It is anticipated that the initial partnership conference will require the facilitator and a conference site. After the initial meeting, monthly partnership meetings will be hosted by the Contractor at the project site.

42. GOVERNMENT RESIDENT MANAGEMENT SYSTEM

The Government will utilize an in-house contract administration program entitled "Resident Manage System" (RMS). The Contractor shall utilize a Government furnished CQC Programming Module. See Section 01312 QUALITY CONTROL SYSTEM (QCS) for requirements.

43. CONSTRUCTION PROJECT SIGNS AND PUBLIC SAFETY SIGN

The Contractor shall construct three signs, one for project identification, one to show on-the-job safety performance, and one public safety sign. Sample sign drawings together with mounting and fabrication details are provided at the end of this section. The signs shall be erected within 15 calendar days after the date of Notice to Proceed. The project identification and safety performance signs are to be displayed side by side and mounted for reading by passing viewers. The public safety sign shall be the same size as the project signs.

Exact placement location will be designated by the Contracting Officer. Panels are fabricated using HDO (High Density Overlay) plywood with dimensional lumber uprights and bracing. The sign faces are non-reflecting vinyl. All legends are to be die-cut or computer-cut in the sizes and type-faces specified and applied to the white panel background following the graphic formats shown on the attached sheets. The Communications Red panel on the left side of the construction project sign with Corps signature (reverse version) is screen printed onto the white background.

The Contractor shall maintain the signs in good condition throughout the construction period. No separate payment will be made for erecting and maintaining the signs and all costs in connection therewith will be considered the obligation of the Contractor. Upon completion of the project, the Contractor shall remove the signs from the project site.

44. BARGES FOR CONTAMINATED RIVER SEDIMENT MATERIAL EXCAVATED FROM BELOW MEAN HIGH TIDE

The Contractor may elect to utilize barges to transport contaminated river sediment material excavated from below mean high tide (see Section 02226). The barge should be of solid hull construction, or if it is a split hull, the seam must be sealed with concrete, epoxy or by other means to eliminate accidental release of the excavated material. The barge should be covered at all times when dredged material is not being actively added to or removed from the barge. The Contractor shall transport the filled barge to an off-loading site. The barge will have a wire mesh screen with openings measuring six inches by six inches to remove solid waste. Solid waste that doesn't pass through the screen shall be disposed of off-site, at approved landfills, in accordance with all Federal, State and local regulations. If the Contractor elects to utilize barges, additional excavation may be required to facilitate barge access. The provisions of Section 02226 for the excavation, transport, treatment, and disposal of contaminated material would pertain to this additional excavation at no cost to the Government.

45. IDENTIFICATION OF DISPOSAL FACILITY OR PROCESSING AND TREATMENT FACILITY FOR EXCAVATED CONTAMINATED RIVER SEDIMENT

Prior to the start of construction, the contractor shall be responsible for the identification of a suitable disposal facility or processing and treatment facility which can accept the contaminated river sediment to be excavated from the project area. The contractor shall be responsible to obtain approval from the State of New Jersey, Department of Environmental Protection, Office of Dredging and Sediment Technology, in accordance with the State Water Quality Certification and Coastal Zone Consistency Statement, for use of the approved facility. The contractor shall also be responsible to receive approval from the Contracting Officer for use of the selected facility. Identification of the facility to be used should be coordinated with the Work Plan discussed in Section 02226.

46. TIMES FOR EXCAVATION OF CONTAMINATED MATERIAL

In conjunction with the siltation control measures (Section 02275), excavation of contaminated material (Section 02226) will be restricted to times of low tide on exposed mud flats.

47. INSURANCE PROCURED BY CONTRACTOR

a. The Contractor shall procure and maintain during the entire period of this performance under this contract the attached insurance policies:

(1) Commercial General Liability Insurance in limits of not less than Five Million Dollars ($5,000,000) combined single limit per occurrence for bodily injury, death, personal injury and property damage, including but not limited to coverage for Broad Form Property Damage. Such coverage shall not contain any environmental exclusion

clause and there shall be no exclusions for property damage arising out of explosion, collapse or underground property damage hazards and no exclusion for waterfront activities.

(2) The policies described above shall be endorsed (i) to include The City of Newark and the State of New Jersey as additional insured and (ii) to provide that notice of an occurrence to the insurance company from any insured shall serve as notice from all insured.

(3) Comprehensive Automobile Liability Insurance in limits of not less than five million dollars combined single limit per occurrence for bodily injury, death, and property damage covering all owned, non-owned and hired vehicles in connection with the work to be performed in connection with this permit.

(4) Certificates of Insurance evidencing the issuance of all insurance required hereby, and guaranteeing at least thirty (30) days prior notice to the Government of cancellation or non-renewal, shall be delivered to The New Jersey Department of Environmental Protection, and City of Newark, prior to entry of the Government's contractors upon the project area, or, in the case of new or renewal policies replacing any policies expiring during the period, no later than thirty (30) days before the expiration dates of such expiring policies.

b. Prior to the commencement of work hereunder, the Contractor shall furnish to the Contracting Officer a certificate or statement of the above required insurance. The policies evidencing required insurance shall contain an endorsement to the effect that cancellation or any material change in the policies adversely affecting the interests of the Government in such insurance shall not be effective for such a period as may be prescribed by the laws of the State in which this contract is to be performed and in no event less than thirty (30) days after written notice thereof to the Contracting Officer.

c. The Contractor agrees to insert the substances of this clause, including paragraph c., in all subcontracts hereunder.

48. LABOR SURPLUS AREA EXPENDITURE REQUIREMENTS (JUL 1978)

a. The site of the construction work is located in an area determined by the Secretary of Labor to be a Labor Surplus Area. Accordingly the Contractor hereby agrees to perform a substantial portion of the contract work in this or in any other labor surplus area. "Substantial portion" means the aggregate costs that will be incurred by the Contractor and his first-tier subcontractors and suppliers, on account of manufacturing, production, or services performed in this or any labor surplus area, and the costs that will be incurred by second-tier and lower-tier subcontractors on the construction site will exceed fifty percent (50%) of the price of this contract.

b. Upon request, the Contractor shall furnish to the Contracting Officer data to substantiate that this obligation is satisfied.

c. The Contracting Officer will furnish upon request a list of labor surplus areas.

49. CONTINUING CONTRACT (1985 OCT OCE):

a. This is a continuing contract, as authorized by Section 10 of the River and Harbor Act of September 22, 1922 (33 U.S. Code 621). The payment of some portion of the contract price is dependent upon reservation of funds from future appropriations. The responsibilities of the Government are limited by this clause notwithstanding any contrary provision of the "Payment to the Contractor" clause or any other clause of this contract.

b. (1) The sum of $3,000,000 has been reserved for this contract and is available for payments to the Contractor during the current fiscal year. It is expected that Congress will make appropriations for future fiscal years from which additional funds will be reserved for this contract.

(2) Failure to make payments in excess of the amount currently reserved, or that may be reserved from time to time, shall not entitle the Contractor to a price adjustment under the terms of this contract except as specifically provided in paragraphs (d) and (e) below. No such failure shall constitute a breach of this contract, except that this provision shall not bar a breach-of-contract action if an amount finally determined to be due as a termination allowance remains unpaid for one year due solely to a failure to reserve sufficient funds therefor.

c. (1) The Government may at any time reserve additional funds for payments under the contract if there are funds available for such purpose. The Contracting Officer will promptly notify the Contractor in writing of any additional funds reserved for the contract.

(2) If earnings will be such that funds reserved for the contract will be exhausted before the end of the fiscal year, the Contractor shall give written notice to the Contracting Officer of the estimated date of exhaustion and the amount of additional funds which will be needed to meet payments due or to become due under the contract during the fiscal year. This notice shall be given not less than 45 nor more than 60 days prior to the estimated date of exhaustion.

d. (1) No payments will be made after exhaustion of funds except to the extent that additional funds are reserved for the contract. The Contractor shall be entitled to simple interest on any payment that the Contracting Officer determines was actually earned under the terms of the contract and would have been made except for exhaustion of funds. Interest shall be computed from the time such payment would otherwise have been made until actually or constructively made, and shall be at the rate established by the Secretary of the Treasury pursuant to Policy Law 92-41, 85 STAT 97, for the Renegotiation Board, as in effect on the first day of the delay in such payment.

(2) Any suspension, delay, or interruption of work arising from exhaustion or anticipated exhaustion of funds shall not constitute

a breach of this contract and shall not entitle the Contractor to any price adjustment under the "Suspension of Work" clause or in any other manner under this contract.

(3) An equitable adjustment in performance time shall be made for any increase in the time required for performance of any part of the work arising from exhaustion of funds or the reasonable anticipation of exhaustion of funds.

e. If, upon expiration of sixty (60) days after the beginning of the fiscal year following an exhaustion of funds, the Government has failed to reserve sufficient additional funds to cover payments otherwise due, the Contractor, by written notice delivered to the Contracting Officer at anytime before such additional funds are reserved, may elect to treat his right to proceed with the work as having been terminated. Such termination shall be consisered a termination for the convenience of the Government.

f. If at any time it becomes apparent that funds reserved for any fiscal year are in excess of the funds required to meet all payments due or to become due the Contractor because of work performed and to be performed under the contract during the fiscal year, the Government reserves the right,
after notice to the Contractor, to reduce said reservation by the amount of such excess.

50. ADDITIONAL CONTRACTOR SURVEY REQUIREMENTS

The Contractor shall be responsible for obtaining a bathymetric and topographic survey of the area described below prior to commencement of the work to confirm existing topography. The survey shall be performed by a licensed surveyor in the State of New Jersey. The Contractor shall be responsible for converting the survey data into an electronic file compatible with the Project's design plans to the satisfaction of the Contracting Officer. The survey information shall include: 1) the top of existing bulkhead from Station 60+00 to Station 70+00 and 2) topographic, bathymetric, and planimetric data for a 100-foot corridor centered on the bulkhead from Station 60+00 to Station 70+00. The topographic and bathymetric data shall be shown in ½-foot contours.

51. SOIL EROSION AND SEDIMENT CONTROL PERMIT

The Contractor shall be responsible for and develop a site-specific sediment and erosion control plan designed for the specific method(s) of construction preferred by the Contractor for each element of construction. All work shall be in accordance with standards for soil erosion and sediment control in New Jersey. Best Management Practices as shown on the plans are intended as the minimum measures to be incorporated into the plan. Prior to commencement of the work, the Contractor shall be required to obtain a Soil Erosion and Sediment Control Permit for all work under this Contract from:

Hudson, Essex and Passaic Soil Conservation District
15 Bloomfield Avenue
North Caldwell, NJ 07006
(973) 364-0786
(973) 364-0784 (fax)

The Contractor shall comply with all requirements of the permit for the duration of the Contract.

52. STATEMENT OF QUALIFICATIONS

At the request of the Contracting Officer prior to contract award, bidders will be required to submit within five (5) days a Statement of Qualifications (SOQ), under oath, which shall include detailed documentation and resumes demonstrating the Bidder's prior relevant experience and its organization's ability to complete the Project. The SOQ shall conform to the following minimum requirements:

1) Related Project Experience

For the work occurring in the eastern and western wetland areas, the Bidder shall provide a description of at least three (3) related Projects, at least two (2) acres in size and occurring within the last seven (7) years, in which the Bidder (or its subcontractor) has used excavators within a marsh environment subject to tidal inundation. The description must include:

- summary of work performed, acreage, and location;
- project cost; and
- client references (including contract, name, address, phone number).

2) Organization Chart and Resumes

Provide an organization chart of key Project personnel, including Project Manger and Site Supervisor. Provide resumes of key personnel.

3) Subcontractor's SOQ

Provide a list of subcontractors with associated Project experience, references, and resumes of key personnel.

Company brochures alone shall not be submitted for the purpose of demonstrating experience and technical expertise. The Government reserves the right at any time to require a Bidder to submit such additional evidence of their qualifications as it may deem necessary and may consider any evidence available to it of the financial, technical, and other qualifications and abilities of the Bidder.

Determinations as to the Bidder's qualifications are reserved to the discretion of the Government. If it is to be awarded, the Contract will be awarded to the lowest responsible Bidder who, in the sole determination of the Government, is fully qualified to undertake the Project and whose proposal conforms in all aspects to the requirements set forth in the Contract Documents.

In addition, in order for bidders to become familiar with the existing conditions at the site, it is recommended that a site visit to the eastern and western wetland areas be made prior to submitting bids.

PROJECT IDENTIFICATION SIGN
CIVIL WORKS PROJECT

The graphic format for this 4' x 6' sign panel follows the legend guidelines and layout as specified below. The large 4' x 4' section of the panel in the right is to be white with black legend. The 2' x 4' section of the sign on the left with the full corps Signature (reverse version) is to be screen printed Communications Red on the white background. The castle insignia will be furnished by the Government in pressure sensitive vinyl for affixing by the Contractor. See attached sheet for fabrication and mounting guidelines.

Legend Group 1: One- to two-line description of Corps relationship to project
Color: White
Typeface: 1.25" Helvetica Regular
Maximum line length: 19"

Legend Group 2: Division or District Name (optional). Place below 10.5" Reverse Signature (6" Castle)
Color: White
Typeface: 1.25" Helvetica Regular

Legend Group 3: One- to three-line project title legend describes the work being done under this contract.
Color: Black
Typeface: 3" Helvetica Bold
Maximum line length: 42"

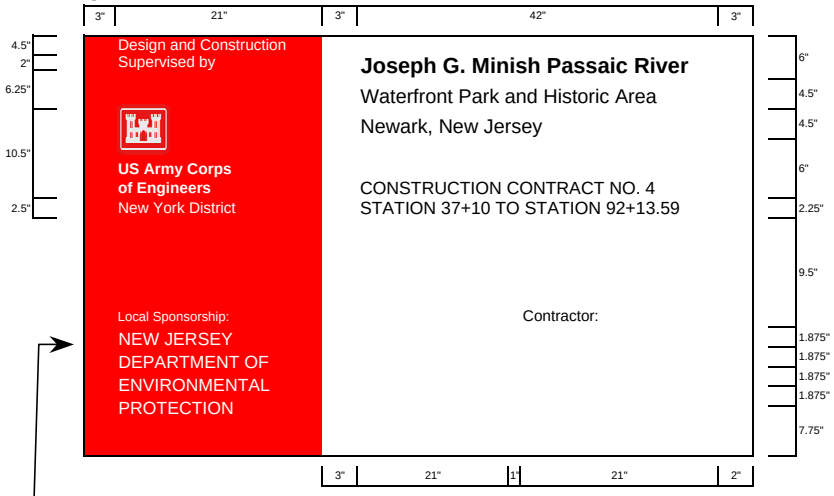
Legend Group 4: One-to two-line identification of project or facility (civil works) or name of sponsoring department (military).
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Cross-align the first of Legend Group 4 with the first line of the Corps Signature (US Army Corps) as shown.

Legend Group 5a-b: One-to-five line identification of prime contractors including: type (architect, general contractor, etc.), corporate or firm name, city, state. Use of Legend Group 5 is optional.
Color: Black
Typeface: 1.25" Helvetica Regular
Maximum line length: 21"

All typography is flush left and rag right upper and lower case with initial capitals only as shown. Letter and word spacing to follow Corps standards as specified in * Appendix D

SAMPLE:



(Dimensions are in inches)

Sign Type	Legend	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-01	various	4' x 6'	4' x 4'	HDO-3	48"	WH-RD/BK

Show non-Federal local partner's name and logo

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

* Refers to the U.S. Army Corps of Engineers, "Sign Standards Manual", EPS-310-1-6.

Fabrication and Mounting Guidelines

As Construction Project Identification signs and Safety Performance signs are to be fabricated and installed as described below. The signs are to be erected at a location designated by the contracting officer and shall conform to the size, format, and typographic standards shown on the attached sheets.

The sign panels are to be fabricated from .75" High Density Overlay Plywood. Panel preparation to follow HDD specifications provided in Appendix B. **

Sign graphics to be prepared on a white non-reflective vinyl film with positionable adhesive backing.

All graphics except for the Communications Red background with Corps signature on the project sign are to be die-cut or computer-cut non-reflective vinyl, pre-spaced legends prepared in the sizes and typefaces specified and applied to the background panel following the graphic formats shown on the attached sheets.

The 2'x4' Communications Red panel (to match PMS-032) with full Corps signature (reverse version) is to be screen printed on the white background. Identification of the District or Division ma be applied under the signature with white cut vinyl letters prepared to Corps standards. Large scale reproduction artwork for the signature is provided on page 4.8 (photographically enlarge from 6.875" to 10.5"). **

Drill and Insert six (6) .375" T-nuts from the front face of the HDD sign panel. Position holes as shown. Flange of T-nut to be flush with sign face.

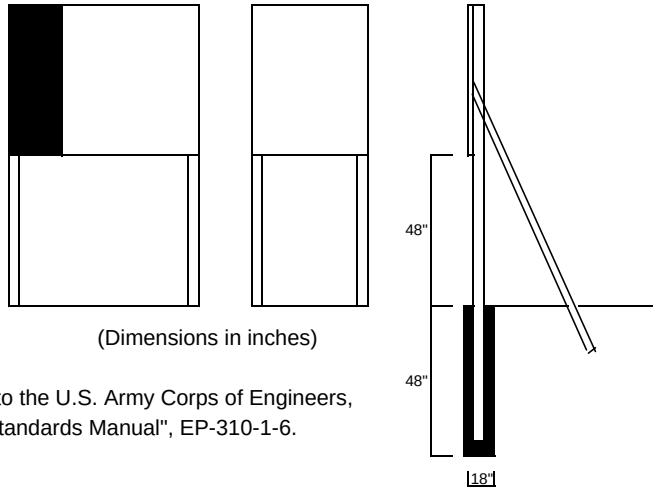
Apply graphic panel to prepared HDD plywood panel following manufacturers' instructions.

Sign uprights to be structural grade 4"x4" treated Douglas Fir or Southern Yellow Pine. No.1 or better. Post to be 12" long. Drill six (6) .375" mounting holes in uprights to align with T-nuts in sign panel. Countersink (.5") back of hole to accept socket head cap screw (4"x.375").

Assemble sign panel and uprights. Imbed assembled sign panel and uprights in 4" hole. Local soil conditions and/or wind loading may require bolting additional 2"x4" struts on inside face of uprights to reinforce installation as shown.

Detailed specifications for HDD plywood panel preparation are provided in Appendix B.**

Shown below the mounting diagram is a panel layout grid with spaces provided for project information. Photocopy this page and use as a worksheet when preparing sign legend orders.



(Dimensions in inches)

** Refers to the U.S. Army Corps of Engineers, "Sign Standards Manual", EP-310-1-6.

Construction Project Sign
Legend Group 1: Corps Relationship

1. _____
2. _____

Legend Group 2: Division/District Name

1. _____
2. _____

Legend Group 3: Project Title

1. _____
2. _____
3. _____

Legend Group 4: Facility Name

1. _____
2. _____

Legend Group 5a: Contractor/A&E

1. _____
2. _____
3. _____
4. _____
5. _____

Legend Group 5b: Contractor /A&E

1. _____
2. _____
3. _____
4. _____
5. _____

Safety Performance Sign
Legend Group 1: Project Title

1. _____
2. _____

Legend Group 2: Contractor/A&E

1. _____
2. _____

SAFETY PERFORMANCE SIGN

The graphic format, color, size and type-faces used on the sign are to be reproduced exactly as specified below. The title with First Aid logo in the top section of the sign, and the performance record captions are standard for all signs of this type. Legend Group 2 and 3 below identify the project and the contractor and are to be placed on the sign as shown. Safety record numbers are mounted on individual metal plates and are screw-mounted to the background to allow for daily revisions to posted safety performance record.

Legend Group1: Standard two-line title "safety is a Job Requirement", with (8" od.) Safety Green First Aid logo. Color: To match PMS 347
Typeface: 3" Helvetica Bold
Color: Black

Legend Group 2: One- to two-line project title legend describes the work being done under this contract and name of host project.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

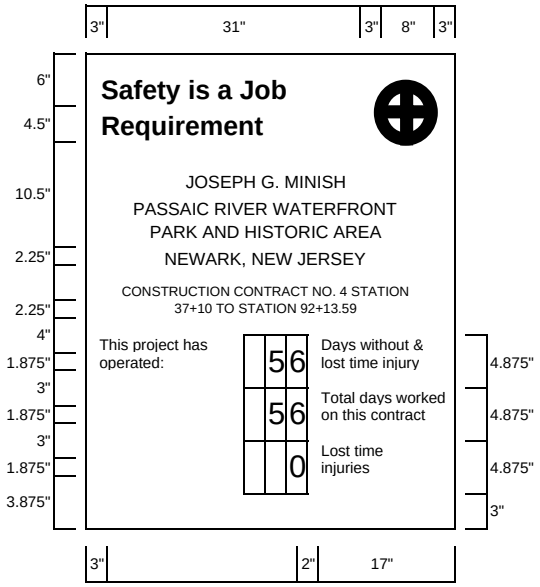
Legend Group 3: One - to two-line identification: name of prime contractor and city, state address.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 4: Standard safety record captions as shown.
Color: Black

Typeface: 1.25" Helvetica Regular

Replaceable numbers are to be mounted on white .060: aluminum plates and screw-mounted to background.
Color: Black
Typeface: 3" Helvetica Regular
Plate size: 2.5"x.5"

All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter- and word-spacing to follow Corps standards as specified in Appendix D. *

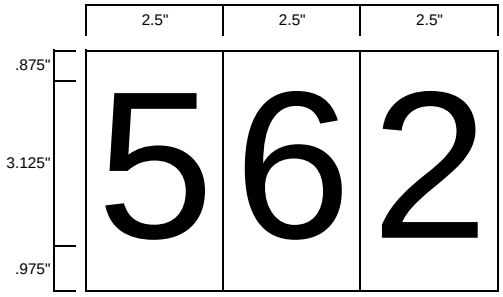


Dimensions inches.

See attached sheet for fabrication and mounting guidelines.

* Refer to the U.S. Army Corps of Engineers, "Sign Standards Manual", EPS-310-1-6.

Sign Type	Legend Size	Panel Size	Post Size	Specifications Code	Mounting Height	Color Bkg/Lgd
CID-02	various	4"x4"	4"x4"	HDO-3	48"	WH/BK-GR



US ARMY

CORPS of ENGINEERS New York District

RED CASTLE

JOSEPH G. MINISH

PASSAIC RIVER WATERFRONT PARK AND HISTORIC AREA,
NEWARK, NEW JERSEY

CONSTRUCTION CONTRACT NO. 4
STATION 37+10 TO STATION 92+13.59

CONTRACTOR:

FUNDED BY: FEDERAL % LOCAL %

COMPLETION DATE:

FOR YOUR SAFETY

RED LETTER

1. DO NOT ENTER DESIGNATED WORK AREAS
2. OBEY ALL STATE AND LOCAL REGULATIONS CONCERNING PROHIBITED ACTIVITIES.

DISTRICT ENGINEER: COL. RICHARD J. POLO JR.

SECTION 00901

APPENDIX A - BORING LOGS

Hole No WTH-5

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	8" NOM O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY WARREN GEORGE, INC.		12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO (As shown on drawing title and file number)	WTH-5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 15 / UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN		14. TOTAL NUMBER CORE BOXES	
		15. ELEVATION N/A	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		16. DATE HOLE	2-7-95 / 2-7-95
7. THICKNESS OF OVERBURDEN	>30 FT.	17. ELEVATION TOP OF MUDLINE	-7.7 FT±
8. DEPTH DRILLED INTO ROCK	0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING	N/A
9. TOTAL DEPTH OF HOLE	30 FT.	19. INSPECTOR(S)	M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			(GP) DARK GRAY COARSE TO FINE GRAVEL, LITTLE COARSE TO FINE SAND, TRACE SILTY CLAY, WET, VERY LOOSE, WEAK PHC ODOR			OVM SCREEN OF SS = 38 ppm	2-1-2-1
			GRADING TO LOOSE			OVM SCREEN OF SS = 21.9 ppm	4-5-5-6
	4.0					OVM SCREEN OF SS = 18.8 ppm	3-3-3-3
			(CL) DARK GRAY SILTY CLAY, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, WET, MEDIUM STIFF, OCCASIONAL ORGANICS, SHEEN ON SAMPLE, WEAK PHC ODOR			OVM SCREEN OF SS = 6.4 ppm	2-3-3-4
	8.0		GRADING WITH SOME FINE GRAVEL AT 6.5 FT.				
			(SP) DARK BROWN-GRAY COARSE TO FINE SAND, LITTLE FINE GRAVEL, TRACE SILT, WET, MEDIUM DENSE		S-1	OVM SCREEN OF SS = 25.0,20.0,16.0 ppm	5-6-8-11
			GRADING TO LITTLE COARSE TO FINE GRAVEL		S-2	OVM SCREEN OF SS = 44,20,8,6 ppm	7-8-11-16
	12.0				S-3		4-4-6-5
			GRADING WITH MODERATE PHC ODOR		S-4		7-7-8-9
	16.0				S-5		6-6-5-9
						NO RECOVERY	8-8-9-12
	20.0		(GP) YELLOWISH RED-OLIVE GRAY COARSE TO FINE GRAVEL, TRACE COARSE TO FINE SAND, TRACE SILT, WET, MEDIUM DENSE		S-6	OVM SCREEN OF SS = 0.0 ppm	12-12-13-13
			(SP) DARK GRAY COARSE TO FINE SAND, TRACE FINE GRAVEL, TRACE SILT, WET DENSE, STRONG PHC ODOR		S-7	OVM SCREEN OF SS = 0.5 ppm	17-18-21-25
	24.0		(CL) YELLOWISH RED LAMINATED SILTY CLAY AND FINE SAND, WET, HARD		S-8	OVM SCREEN OF SS = 0.0 ppm	14-16-16-23
			GRADING TO TRACE FINE SAND		S-9	OVM SCREEN OF SS = 0.0 ppm	12-15-19-23
	28.0						

Hole No. WTH-5

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO (As shown on drawing title and file number) WTH-5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 2-7-95 2-7-95
7. THICKNESS OF OVERBURDEN >30 FT.	17. ELEVATION TOP OF MUDLINE -7.7 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 30 FT.	19. SIGNATURE OF INSPECTOR(S) M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			(SM) YELLOWISH RED FINE SAND AND SILT, WET, MEDIUM DENSE		S-10	OVM SCREEN OF SS = 0.0 ppm 14-14-15-17
	32.0		NOTES: 1. BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-7-95. 2. BOREHOLE GROUTED WITH CEMENT/BENTONITE. 3. SURFACE WATER VARIED BETWEEN 6.5 FT AND 9.5 FT. IN THICKNESS DURING DRILLING. 4. ENVIRONMENTAL SAMPLES COLLECTED AS FOLLOWS: a) WHT-5A, 0-6', COMPOSITE b) WTH-5A, 1-2', DISCRETE c) WTH-5B, 10-11', COMPOSITE d) WTH-5B, 10-11', DISCRETE			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. NKG-12

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-12	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 31 — UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-26-94 — 3-26-94
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 7.4 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			ASPHALT PARKING LOT				
			CRUSHSTONE BASE COARSE MAT'L				
			(GM) REDDISH BLACK SILTY GRAVEL	0.4	JAR #1		-4-7
			SAME(MOIST)	0.4	JAR #2		5-6-5
	3.0		(GM) BLACK SILTY GRAVEL	0.3	JAR #3		3-2-3
			SAME W/ CINDERS & ASPHALT	0.3	JAR #4	▼	1-2-2
	6.0		SAME	0.3	JAR #5		1-2-2
			SAME	0.2	JAR #6		wh-wh-1
	9.0		SAME	0.3	JAR #7		1-1-2
			SAME	0.2	JAR #8	DRILLER SET 18' 4" CASING	1-1-1
	12.0		END OF FILL				
			SAME	0.1	JAR #9		wh-1-2
			(ML) GRAY CLAYEY SILT	0.2	JAR #10	INT. G.W. ENC. AT d. 6.0 STATIC W.L. AT d. 5.7 AFTER 30 MIN.	1-1-2
	15.0		(GM) GRAY SILTY GRAVEL W/ SAND	0.4	JAR #11		1-2-2
			(ML) GRAY CLAYEY SILT	0.8	JAR #12		1-1-1
	18.0		(SP) GRAY POORLY GRADED SAND W/ SILT	0.6	JAR #13		4-5-5
			SAME	0.5	JAR #14	TABLE B-1 (31A)	5-4-5
	21.0						

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-12

00901-4

Hole No. NKG-12

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, C GVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-12	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 31; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-26-94 3-26-94
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 7.4 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
			(SW) GRAY WELL-GRADED SAND W/ SILT	0.8	JAR #15	3-5-8
	24.0		SAME	0.8	JAR #16	2-5-8
			SAME	0.7	JAR #17	3-5-8
			SAME	0.7	JAR #18	4-7-9
	27.0		(SW) GRAY WELL-GRADED SAND W/ SILT & GRAVEL	0.5	JAR #19	7-9-9
			SAME	0.4	JAR #20	7-10-6
	30.0		SAME	0.3	JAR #21	4-3-4
			(GM) LT. RED SILTY GRAVEL W/ SAND	0.3	JAR #22	4-12-12
	33.0		(GM) REDDISH BLACK SILTY BLACK W/ SAND	0.3	JAR #23	7-15-18
	36.0					
			(ML) RED CLAYEY SILT	1.0	JAR #24	12-15-17
	39.0					
			(ML) RED CLAYEY SILT	0.8	JAR #25	10-14-17
	42.0					

TABLE B-1 (31B)

ENG FORM 1836 | PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-12

Hole No. NKG-12

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-12	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 31; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-26-94 | 3-26-94
	17. ELEVATION TOP OF HOLE 7.4 ±
7. THICKNESS OF OVERBURDEN 71.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR J. CHILDESS
9. TOTAL DEPTH OF HOLE 71.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		SAME	0.7	JAR #26		9-12-12
	48.0						
	51.0		SAME	1.0	JAR #27		14-16-20
	54.0						
			SAME	1.0	JAR #28		16-21-32
	57.0						
	60.0		SAME	1.2	JAR #29		20-30-32
	63.0						

TABLE B-1 (31C)

Hole No. NKG-12

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-12	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 31; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-26-94 | 3-26-94
	17. ELEVATION TOP OF HOLE 7.4 ±
7. THICKNESS OF OVERBURDEN 71.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR J. CHILDESS
9. TOTAL DEPTH OF HOLE 71.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		SAME	1.1	JAR #30	16-26-28
	69.0		SAME	1.1	JAR #31	16-26-34
	71.5		BOTTOM OF BORING 71.5'			TREMMIE GROUTED HOLE W/ 6 BAGS GROUT
	72.0					
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (31D)

Hole No. GH-4

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) GH-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 24; UNDISTURBED 0
5. NAME OF DRILLER R. LONDON	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUNDWATER
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	16. DATE HOLE 6-11-94 6-11-94
7. THICKNESS OF OVERBURDEN 51.5	17. ELEVATION TOP OF HOLE 8.6 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 51.5	19. SIGNATURE OF INSPECTOR D. DILLON

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			ASPHALT & CONCRETE OVER (SM) BROWN & BLACK SILTY SAND	1.5	JAR #1	HTW SITE CONTAMINATS UNKNOWN	11
			SAME	1.5	JAR #2	PPE LEVEL D MODIFIED 16.5' OF 4" CASING SET	14
	3.0		(SW) BLACK WELL-GRADED SAND W/ GRAVEL & BRICK FRAG.	1.5	JAR #3	PHOTOVAC 0.0PPM	11
			SAME	1.5	JAR #4	PHOTOVAC 0.0PPM INT. G.W. ENC. AT d. 7.0	6
	6.0		(SW) BROWN WELL-GRADED SAND W/ GRAVEL & BRICK FRAG.	1.5	JAR #5	▼ PHOTOVAC 0.0PPM	3
			(SM) BROWN SILTY SAND W/ GRAVEL & CONCRETE FRAG.	0.3	JAR #6	PHOTOVAC 0.0PPM	4
	9.0		(SM) DK. BROWN SILTY SAND W/ GRAVEL	1.5	JAR #7	PHOTOVAC 0.0PPM	7
			(SW) BROWN WELL-GRADED SAND W/ GRAVEL	1.5	JAR #8	PHOTOVAC 0.0PPM	13
	12.0		END OF FILL				
			(SM) BROWN SILTY SAND W/ GRAVEL	0.8	JAR #9	PHOTOVAC 0.0PPM	23
			SAME	0.9	JAR #10	PHOTOVAC 0.0PPM	14
	15.0		(SP) BROWN POORLY GRADED SAND W/ GRAVEL	1.1	JAR #11	PHOTOVAC 0.0PPM	20
			(ML) GRAY SILT W/ GRAVEL	0.4	JAR #12	PHOTOVAC 0.0PPM	9
	18.0		(SM) GRAY SILTY SAND	1.5	JAR #13	PHOTOVAC 0.0PPM	5
			(SW) GRAY WELL-GRADED SAND	1.0	JAR #14	PHOTOVAC 0.0PPM	17
	21.0						

TABLE B-1 (7A)

Hole No. GH-4

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 2 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR MGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) GH-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 24; UNDISTURBED 0
5. NAME OF DRILLER R. LONDON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 6-11-94 6-11-94
	17. ELEVATION TOP OF HOLE 8.6 ±
7. THICKNESS OF OVERBURDEN 51.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. DILLON
9. TOTAL DEPTH OF HOLE 51.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(SW) GRAY WELL-GRADED SAND W/ GRAVEL	0.7	JAR #15	PHOTOVAC 0.0PPM	15
			SAME	0.9	JAR #16	PHOTOVAC 0.0PPM	12
	24.0		SAME	1.0	JAR #17	PHOTOVAC 0.0PPM	13
			(SW) DK. GRAY WELL-GRADED SAND W/ GRAVEL	1.0	JAR #18	PHOTOVAC 0.0PPM	17
	27.0		SAME	0.9	JAR #19	PHOTOVAC 0.0PPM	19
			SAME	1.2	JAR #20	PHOTOVAC 0.0PPM	33
	30.0						
	33.0						
	36.0		(ML) BROWN SILT	1.5	JAR #21	PHOTOVAC 0.0PPM	22
	39.0						
			SAME	1.5	JAR #22	PHOTOVAC 0.0PPM	40
	42.0						

TABLE B-1 (7B)

Hole No. GH-4

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 3 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) GH-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 24; UNDISTURBED 0
5. NAME OF DRILLER R. LONDON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 6-11-94 / 6-11-94
7. THICKNESS OF OVERBURDEN 51.5	17. ELEVATION TOP OF HOLE 8.6 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 51.5	19. SIGNATURE OF INSPECTOR D. DILLON

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		SAME	1.5	JAR #23	PHOTOVAC 0.0PPM	29
	48.0		SAME	1.5	JAR #24	PHOTOVAC 0.0PPM	26
	51.0		BOTTOM OF BORING 51.5'			BORING GROUTED W/ 5 BAGS OF GROUT	
	54.0						
	57.0						
	60.0						
	63.0						

TABLE B-1 (7C)

Hole No. WT-6

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 4" NOM WATER ROTARY
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WT-6	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION N/A
	16. DATE HOLE 1-30-65 1-30-95
7. THICKNESS OF OVERBURDEN >30 FT.	17. ELEVATION TOP OF MUDLINE -9.5 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 30 FT.	19. INSPECTOR(S) D. MAZUJIAN

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			(OH) BLACK ORGANIC CLAY, TRACE MEDIUM TO FINE SAND, WET, VERY SOFT, STRONG PHC ODOR, STAINED BLACK		S-1	OVM SCREEN OF SS = BDL WOR/2 FT
			GRADING WITH TRACE FINE GRAVEL TRACE ORGANICS		S-2	OVM SCREEN OF SS = 0.5 TO 5.8 ppm WOR/2 FT
	4.0				S-3	OVM SCREEN OF SS = 3.4 TO 8.5 ppm WOR/2 FT
					S-4	OVM SCREEN OF SS = 5.1 TO 13.6 ppm WOR/2 FT
	8.0				S-5	OVM SCREEN OF SS = 7.4 TO 11.6 ppm WOR/1 FT-2-4
			(GP) 3 IN. LAYER OF BROWNISH YELLOW SAND STONE/SILT STONE		S-6	OVM SCREEN OF SS = 4.5 ppm 18-15-12-9
	12.0		(SP) GRAY-BROWN MEDIUM TO FINE SAND, TRACE SILT, MEDIUM DENSE, WET WEAK PHC ODOR		S-7	OVM SCREEN OF SS = BDL 7-7-8-9
			GRADING WITHOUT ODOR			
			GRADING WITH LITTLE FINE GRAVEL		S-8	9-19-15-11
			GRADING TO COARSE TO FINE SAND SOME COARSE TO FINE GRAVEL, TRACE SILT			
	16.0				S-9	OVM SCREEN OF SS = 10 TO 60 ppm 7-11-11-14
			(GP) DARK BROWN COARSE TO FINE GRAVEL AND COARSE TO FINE SAND, TRACE SILT, WET, MEDIUM DENSE, FREQUENT BLACK STAINING WITH, CHEMICAL ODOR		S-10	OVM SCREEN OF SS = 168 ppm 9-14-21-17
	20.0		GRADING TO DENSE		S-11	OVM SCREEN OF SS = 56 TO 182.5 ppm 10-10-12-14
			(SM) YELLOWISH RED FINE SAND, LITTLE SILT, WET, MEDIUM DENSE, FREQUENT BLACK STAINING, CHEMICAL ODOR		S-12	OVM SCREEN OF SS = 8.4 TO 18.2 ppm 13-13-14-14
	24.0				S-13	OVM SCREEN OF SS = 10 TO 12 ppm 11-10-12-14
	28.0				S-14	OVM SCREEN OF SS = 7.4-10.5 ppm 11-10-11-13

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	Hole No WT-6 SHEET 2 OF 2 SHEETS

1 PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 4" NOM WATER ROTARY
2 LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3 DRILLING AGENCY WARREN GEORGE, INC	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4 HOLE NO (As shown on drawing title and file number) WT-6	13. TOTAL NO OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5 NAME OF DRILLER J GORMAN	14 TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION N/A
	16. DATE HOLE 1-30-95 1-30-95
7 THICKNESS OF OVERBURDEN >30 FT	17. ELEVATION TOP OF MUDLINE -9.5 FT=
8 DEPTH DRILLED INTO ROCK 0.0 FT.	18 TOTAL CORE RECOVERY FOR BORING N/A
9 TOTAL DEPTH OF HOLE 30 FT.	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			GRADING TO DENSE		S-15	OVM SCREEN OF SS = 13 TO 38 ppm 11-17-17-12
	32.0		NOTES 1. BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 1-30-95 2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 11.8 AT AND 14.5 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT.			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. H-3

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 1 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) H-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0
5. NAME OF DRILLER MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 6-20-94 6-20-94
	17. ELEVATION TOP OF HOLE 8.6 ±
7. THICKNESS OF OVERBURDEN 4.0	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR M. ROGALSKI
9. TOTAL DEPTH OF HOLE 4.0	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(FILL) ASPHALT, SAND, & GRAVEL	0.8	JAR #1	@ G.S. PHOTOVAC 16.5 PPM LEL/O_2 METER 0.0 PPM	1-9-9-16
	3.0		SAME	0.9	JAR #2		13-8-24-50+
			BOTTOM OF BORING 16.0 DRILLER CLAIMED TO HIT MAT'L HE COULD NOT PENETRATE				
	6.0						
	9.0						
	12.0						
	15.0						
	18.0						
	21.0						

TABLE B-1 (14)

Hole No. GH-3

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) GH-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 26; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUNDWATER
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	16. DATE HOLE 6-4-94 6-6-94
	17. ELEVATION TOP OF HOLE 7.8 ±
7. THICKNESS OF OVERBURDEN 61.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. DILLON
9. TOTAL DEPTH OF HOLE 61.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(ML) RED SILT W/ ASPHALT & WOOD FRAG.	1.5	JAR #1	HTW SITE CONTAMINATS UNKNOWN	35
			SAME	1.5	JAR #2	PPE LEVEL D MODIFIED	26
	3.0		(ML) BROWN SANDY SILT W/ GRAVEL & ASPHALT FRAG.	1.5	JAR #3	PHOTOVAC 0.0PPM	25
			SAME	1.5	JAR #4	PHOTOVAC 0.0PPM ▼	3
	6.0		(SM) BROWN SILTY SAND W/ ORGANICS	1.5	JAR #5	INT. G.W. ENC. AT d. 5.8 PHOTOVAC 0.0PPM	14
			SAME	1.5	JAR #6	PHOTOVAC 0.0PPM	10
	9.0		(SM) BROWN SILTY SAND W/ GRAVEL, ASPHALT, & WOOD FRAG.	0.5	JAR #7	PHOTOVAC 0.0PPM	11
			(GM) BROWN SILTY GRAVEL END OF FILL	0.5	JAR #8	PHOTOVAC 0.0PPM	4
	12.0		(ML) DK. GRAY SANDY SILT	0.3	JAR #9	PHOTOVAC 0.0PPM	2
	13.5		SAME	0.9	JAR #10	PHOTOVAC 0.0PPM	5
	15.0		SAME	1.5	JAR #11	PHOTOVAC 0.0PPM	3
			SAME	1.5	JAR #12	PHOTOVAC 0.0PPM	12
	18.0		(SW) DK. GRAY WELL-GRADED SAND	1.5	JAR #13	PHOTOVAC 0.0PPM	28
			SAME	1.5	JAR #14	PHOTOVAC 0.0PPM	20
	21.0						

TABLE B-1 (6A)

Hole No. GH-3

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 2 OF 3 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	GH-3
5. NAME OF DRILLER	C. MOON
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	61.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	61.5
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTURER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 26 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	6-4-94 / 6-6-94
17. ELEVATION TOP OF HOLE	7.8 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. DILLON

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	1.5	JAR #15	PHOTOVAC 0.0PPM	14
			(SW) DK. GRAY WELL-GRADED SAND W/ GRAVEL	0.9	JAR #16	PHOTOVAC 0.0PPM	8
	24.0		SAME	1.0	JAR #17	PHOTOVAC 0.0PPM	19
			SAME	1.1	JAR #18	PHOTOVAC 0.0PPM	12
	27.0		SAME	1.0	JAR #19	PHOTOVAC 0.0PPM	20
			SAME	1.5	JAR #20	PHOTOVAC 0.0PPM	27
	30.0						
	33.0						
	36.0		(ML) REDDISH BROWN SILT (PLEISTOCENE)	1.5	JAR #21	PHOTOVAC 0.0PPM	30
	39.0						
			SAME	1.5	JAR #22	PHOTOVAC 0.0PPM	24
	42.0						

TABLE B-1 (6B)

Hole No. GH-3

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 3 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) GH-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 26; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 6-4-94 6-6-94
	17. ELEVATION TOP OF HOLE 7.8 ±
7. THICKNESS OF OVERBURDEN 61.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. DILLON
9. TOTAL DEPTH OF HOLE 61.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		SAME	1.5	JAR #23	PHOTOVAC 0.0PPM	22
	48.0						
	51.0		SAME	1.5	JAR #24	PHOTOVAC 0.0PPM	32
	54.0						
	57.0		SAME	1.5	JAR #25	PHOTOVAC 0.0PPM	35
	60.0						
			SAME	1.5	JAR #26	PHOTOVAC 0.0PPM	33
	63.0		BOTTOM OF BORING 61.5'			BORING GROUTED W/ 5 BAGS OF GROUT	

TABLE B-1 (6C)

ENG FORM 1836 PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK HOLE NO. GH-3

00901-16

Hole No. NKG-11

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-11	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 28; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER DEPTH: 6.0'
	16. DATE HOLE 3-30-94 3-31-94
7. THICKNESS OF OVERBURDEN 66.5	17. ELEVATION TOP OF HOLE 6.6 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 66.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(GM) BLACK SILTY GRAVEL W/ SAND	0.0	JAR #1		1-1-1
			SAME	0.0	JAR #2		1-1-1
	3.0		(SM) BROWN SILTY F SAND W/ TR. GRAVEL	0.7	JAR #3		1-3-5
			(GM) REDDISH BROWN SILTY GRAVEL W/ SAND	0.4	JAR #4		3-4-5
	6.0		(SP) LT. RED POORLY GRADED SAND W/ SILT & GRAVEL	0.5	JAR #5		3-2-1
			SAME	0.3	JAR #6		1-1-2
	9.0		SAME	0.5	JAR #7		1-2-3
			(ML) GRAY SILTY CLAY W/ WOOD FIBERS	0.7	JAR #8		1-2-2
	12.0		SAME	1.0	JAR #9		2-3-3
	13.5		END OF FILL				
			SAME	1.2	JAR #10	DRILLER SET 12' 4" CASING MX POLY-SAL	1-2-3
	15.0		(SM) GRAY SILTY F SAND	0.5	JAR #11	INT. G.W. ENC. AT d. 6.0 STATIC W.L. AT d. 3.8 AFTER 0.5 HRS.	2-3-4
			(SP) GRAY POORLY GRADED SAND W/ SILT	0.4	JAR #12		2-5-7
	18.0		SAME	0.4	JAR #13		3-6-7
			SAME	0.3	JAR #14	TABLE B-1 (30A)	3-6-7
	21.0						

Hole No. NKG-11

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-11	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 28; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-30-94 3-31-94
7. THICKNESS OF OVERBURDEN 66.5	17. ELEVATION TOP OF HOLE 6.6 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 66.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	0.5	JAR #15		4-5-7
	24.0		(SW-SM) GRAY SILTY SAND	0.4	JAR #16		3-5-8
			SAME	0.6	JAR #17		3-3-7
	27.0		(SW) GRAY WELL-GRADED SAND W/ SILT	0.5	JAR #18		4-8-9
			SAME	0.5	JAR #19		11-19-16
	30.0		(SM) GRAY SILTY F SAND W/ GRAVEL	0.6	JAR #20		4-4-25
			SAME	0.5	JAR #21		14-19-21
	33.0						
	36.0		(SM) RED SILTY SAND	0.5	JAR #22		8-10-10
	39.0						
	42.0		(ML) RED CLAYEY SILT	0.9	JAR #23		11-17-17

TABLE B-1 (30B)

Hole No. NKG-11

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RE
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-11	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 28; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-30-94 3-31-94
	17. ELEVATION TOP OF HOLE 6.6 ±
7. THICKNESS OF OVERBURDEN 66.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR J. CHILDESS
9. TOTAL DEPTH OF HOLE 66.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(ML) RED CLAYEY SILT	0.7	JAR #24		7-11-[illegible]
	48.0						
	51.0		SAME	1.2	JAR #25		14-21-[illegible]
	54.0						
	57.0		SAME	1.2	JAR #26		18-37-46
	60.0						
	63.0		SAME	1.1	JAR #27		9-17-30

TABLE B-1 (30C)

Hole No. NKG-11

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	5" AUGER & 3 1/2" RE
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY MOBILE DISTRICT		12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C	
4. HOLE NO. (As shown on drawing title and file number)	NKG-11	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 28 / UNDISTURBED 0
5. NAME OF DRILLER J. BUSH		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUNDWATER	
		16. DATE HOLE	3-30-94 / 3-31-94
		17. ELEVATION TOP OF HOLE	6.6 ±
7. THICKNESS OF OVERBURDEN	66.5	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0	19. SIGNATURE OF INSPECTOR J. CHILDESS	
9. TOTAL DEPTH OF HOLE	66.5		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		SAME	0.9	JAR #28	8-11-17
			BOTTOM OF BORING 66.5'			TREMMIE GROUTED HOLE W/ 6 BAGS OF GROUT
	69.0					
	72.0					
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (30D)

Hole No. NKG-11 U

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 1 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-11 U	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 0; UNDISTURBED 2
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-05-94 4-05-94
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN 17.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR K. HOLOWAY
9. TOTAL DEPTH OF HOLE 17.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	3.0					
	6.0					
	9.0					
			(CL) DK. GRAY LEAN CLAY CF SAND		SAMPLE #1	UNDISTURBED SAMPLE
	12.0					
	15.0					
			(GM) BROWN SILTY GRAVEL UP TO 1.5" IN BOTTOM		SAMPLE #2	UNDISTURBED SAMPLE
	18.0		BOTTOM OF BORING 19.4'			
	21.0					

TABLE B-1 (30E)

Gannett Fleming
ENGINEERS AND PLANNERS

Hole No. S-12

DRILLING LOG	DIVISION NEW YORK DISTRICT, PASSAIC RIVER DIVISION	INSTALLATION	SHEET 1 OF 2
1. PROJECT J.G. MINISH PASSAIC RIVER WATERFRONT PARK - BULKHEAD WALL		10. SIZE AND TYPE OF BIT	4-INCH TRICONE
2. LOCATION (Coordinates or Station) N692404.34 E586527.65		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	MSL
3. DRILLING AGENCY JERSEY BORING & DRILLING COMPANY, INC.		12. MANUFACTURER'S DESIGNATION OF DRILL	ACKER AD2
4. HOLE NO.(As shown on drawing title and file number)	S-12	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 31 / UNDISTURBED 0
5. NAME OF DRILLER	D. PEPE	14. TOTAL NUMBER CORE BOXES	0
6. DIRECTION OF HOLE		15. ELEVATION GROUNDWATER	0 hr. 3.9 Ft. / 24 hr. Grouted
VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL 0		16. DATE HOLE	STARTED 08/05/97 / COMPLETED 08/06/97
7. THICKNESS OF OVERBURDEN	62.0 Ft.	17. ELEVATION TOP OF HOLE	7.1 Ft.
8. DEPTH DRILLED INTO ROCK	0.0 Ft.	18. TOTAL CORE RECOVERY FOR BORING	–
9. TOTAL DEPTH OF HOLE	62.0 Ft.	19. INSPECTOR	T. WADDINGTON

Elevation (Ft.) a	Depth b	Legend c	Classification (Description) d	Rec/RQD (%) e	Sample No. f	Remarks	SPT Blows
6.6	0		BITUMINOUS CONCRETE		S-1		
			(gw), brown and black Sandy GRAVEL, wet, dense, Fill material				20-21-22-24
					S-2		63-100/.1
					S-3		10-9-100/.3
	5		Wood at 4.5'				
			VOID at 5.0' to 5.6'		S-4		3-6-8-9
-0.9			(sm), dark brown Silty SAND, coarse- to fine-grained, wet, dense, oil sheen and odor		S-5	Sample jar PID = 92 ppm	13-21-22-33
	10				S-6	Sample jar PID = 98 ppm	19-12-18-9
-4.9			(cl), dark gray Silty CLAY, moist, soft		S-7	pp = 0.25 tons per square foot	2-1-1-2
			Creosote odor, petroleum very concentrated at top of Clay				
-7.4	15		(sp), dark gray SAND, medium- to fine-grained, wet, medium dense, petroleum sheen and odor		S-8		2-4-3-5
					S-9		3-6-8-10
					S-10		5-6-11-15
	20				S-11		9-11-16-16
					S-12		4-10-13-15
			(sw) Sand grading coarse to fine at 24.0'		S-13		12-16-18-18
	25				S-14		13-14-15-14
			With medium to fine Gravel at 28.0' to 34.7'		S-15	Sample jar PID = 319 ppm	11-21-22-39
	30						

Gannett Fleming
ENGINEERS AND PLANNERS

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE 7.1 Ft. | Hole No. S-12

PROJECT J.G. MINISH PASSAIC RIVER WATERFRONT PARK - BULKHEAD WALL | INSTALLATION | SHEET 2 OF 2

Elevation (Ft.) a	Depth b	Legend c	Classification (Description) d	Rec/RQD (%) e	Sample No. f	Remarks	SPT Blows
	30				S-16		27-31-27-26
					S-17		22-25-22-15
-27.4	35		(sm), reddish-brown Silty SAND, very fine-grained, poorly graded, wet, dense, Alluvium Concentrated petroleum at 34.5'		S-18	Sample in two jars: 18 and 18A	12-23-35-17
					S-19		15-21-23-17
					S-20		18-27-25-26
	40				S-21		9-9-7-6
-34.9			(ml), reddish-brown Clayey SILT with very fine Sand, moist, loose, Alluvium		S-22	pp = 1.0 tons per square foot	WOH-WOH-5-11
	45				S-23	pp = 1.0 tons per square foot	12-12-23-18
					S-24	pp = 1.5 tons per square foot	9-14-26-23
-41.9			(sm), reddish-brown Silty SAND, very fine-grained, poorly graded, wet, dense, Alluvium		S-25		15-19-26-30
	50				S-26		17-18-27-27
					S-27		26-30-44-40
	55				S-28		18-34-40-65
-48.9			(ml), reddish-brown Clayey SILT with fine Sand, moist, very dense, Alluvium		S-29	pp = 1.6 tons per square foot	23-29-44-42
					S-30	pp = 1.5 tons per square foot	38-48-67-60
	60				S-31	pp = 1.5 tons per square foot	27-27-52-38
-54.9			Bottom of Boring = 62.0 Ft.				
	65						
	70						

Gannett Fleming
ENGINEERS AND PLANNERS

Hole No. S-12A

DRILLING LOG	DIVISION NEW YORK DISTRICT, PASSAIC RIVER DIVISION	INSTALLATION	SHEET 1 OF 2
1. PROJECT J.G. MINISH PASSAIC RIVER WATERFRONT PARK - BULKHEAD WALL		10. SIZE AND TYPE OF BIT 4-INCH TRICONE	
2. LOCATION (Coordinates or Station) N692404.34 E586532.65		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY JERSEY BORING & DRILLING COMPANY, INC.		12. MANUFACTURER'S DESIGNATION OF DRILL ACKER AD2	
4. HOLE NO. (As shown on drawing title and file number) S-12A		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 0 / UNDISTURBED 3
5. NAME OF DRILLER D. PEPE		14. TOTAL NUMBER CORE BOXES 0	
6. DIRECTION OF HOLE		15. ELEVATION GROUNDWATER	0 hr. 3.8 Ft. / 24 hr. Grouted
VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL 0		16. DATE HOLE	STARTED 08/06/97 / COMPLETED 08/06/97
7. THICKNESS OF OVERBURDEN 47.0 Ft.		17. ELEVATION TOP OF HOLE 7.1 Ft.	
8. DEPTH DRILLED INTO ROCK 0.0 Ft.		18. TOTAL CORE RECOVERY FOR BORING --	
9. TOTAL DEPTH OF HOLE 47.0 Ft.		19. INSPECTOR T. WADDINGTON	

Elevation (Ft.) a	Depth b	Legend c	Classification (Description) d	Rec/RQD (%) e	Sample No. f	Remarks SPT Blows
	0					Advanced boring to 12.0' to collect Shelby tube sample
	5					
	10					
-4.9			(cl), dark gray Silty CLAY, moist		U-1	Pushed Shelby tube (Rec. = 2.0')
-6.9	15					
	20					
	25					
	30					

Gannett Fleming
ENGINEERS AND PLANNERS

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE 7.1 Ft.	Hole No. S-12A
PROJECT J.G. MINISH PASSAIC RIVER WATERFRONT PARK - BULKHEAD WALL	INSTALLATION	SHEET 2 OF 2

Elevation (Ft.) a	Depth b	Legend c	Classification (Description) d	Rec/RQD (%) e	Sample No. f	Remarks SPT Blows
	30					
	35					
	40					
-35.9			(ml), reddish-brown Clayey SILT with very fine Sand, moist		U-2	Pushed Shelby tube (Rec. = 1.8')
	45				U-3	Pushed Shelby tube (Rec. = 2.0')
-39.9			Bottom of Boring = 47.0 Ft.			
	50					
	55					
	60					
	65					
	70					

Project: J.G. MINISH PASSAIC RIVER WATERFRONT PARK - BULKHEAD WALL | Hole No. S-12A

Hole No WT-5

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO (As shown on drawing title and file number) WT-5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	16. DATE HOLE 2-1-95 2-2-95
7. THICKNESS OF OVERBURDEN >30 FT.	17. ELEVATION TOP OF MUDLINE -14.7 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 30 FT.	19. INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			(OH) BLACK ORGANIC CLAY, TRACE MEDIUM TO FINE SAND, WET, VERY SOFT, STAINED BLACK, STRONG PHC ODOR		S-1	OVM SCREEN OF SS = 1.1 ppm WOR/2 FT
			GRADING WITH LITTLE MEDIUM TO FINE SAND		S-2	OVM SCRREEN OF SS = 16.0 ppm WOR/2 FT
	4.0		GRADING WITH OCCASIONAL POCKETS OF DECOMPOSED ORGANIC MATTER		S-3	OVM SCREEN OF SS = 8.1,4.9,26 ppm WOR/2 FT
					S-4	OVM SCREEN OF SS = 12.4,14,13.3 ppm 3-4-25-33
	8.0		(SP) DARK GRAY-DARK BROWN COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL, TRACE SILT, WET, DENSE, PHC ODOR, SHEEN ON SAMPLE		S-5	OVM SCREEN OF SS = 1.4,24.0,16.6 ppm 17-19-20-22
					S-6	29-25-29-28
	12.0		3" THICK LAYER OF SILTSTONE		S-7	22-23-27-30
			(SM) YELLOWISH RED FINE SAND AND SILT, WET, DENSE, SHEEN ON SAMPLE, OCCASIONALLY STAINED BLACK, STRONG WEAK PHC ODOR		S-8	15-15-16-13
	16.0		GRADING WITHOUT SHEEN ON SAMPLE WEAK PHC ODOR GRADING TO MEDIUM DENSE		S-9	11-11-12-14
					S-10	OVM SCREEN OF SS = 2.9 ppm 12-10-11-9
	20.0		(ML) YELLOWISH RED SILT AND FINE SAND, WET, HARD, WEAK PHC ODOR OCCASIONAL BLACK STAINING		S-11	OVM SCREEN OF SS = 0.9 ppm 17-17-23-32
					S-12	OVM SCREEN OF SS = 10.0 ppm 18-18-21-23
	24.0				S-13	OVM SCREEN OF SS = 2.2 ppm 12-16-16-15
			GRADING TO MEDIUM STIFF, TRACE FINE SAND		S-14	OVM SCREEN OF SS = 0.9 ppm 12-12-13-14
	28.0					

ENG FORM 1836 | PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK | HOLE NO. WT-5

00901-26

Hole No WT-5

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO (As shown on drawing title and file number) WT-5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 2-1-95 2-2-95
7. THICKNESS OF OVERBURDEN >30 FT	17. ELEVATION TOP OF MUDLINE -14.7 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 30 FT.	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			GRADING WITH OCCASIONAL POCKETS OF CLAYEY SILT, WITHOUT PHC ODOR OR BLACK STAINING		S-15	OVM SCREEN OF SS = 0 30
	32.0		NOTES 1 BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-23-95. 2 SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 13 FT AND 18.25 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT/BENTONITE GROUT.			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. H-2

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 1 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) H-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 9; UNDISTURBED 0
5. NAME OF DRILLER MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 6-16-94 6-16-94
7. THICKNESS OF OVERBURDEN 16.0	17. ELEVATION TOP OF HOLE 6.8 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 16.0	19. SIGNATURE OF INSPECTOR M. ROGALSKI

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
			(GM) SILTY GRAVEL W/ ASPHALT FRAG.		JAR #1	PID FOUND 0.0 PPM LEL/O_2 METER 0.0 PPM
			SAME		JAR #2	
	3.0		SAME		JAR #3	
			SAME		JAR #4	
	6.0		(GM) SILTY GRAVEL W/ SAND & ASPHALT FRAG. (FILL) OVER (CL) LEAN CLAY		JAR #5	
	9.0		(SW) WELL-GRADED SAND W/ W/ F GRAVEL		JAR #6	PID FOUND 0.0 PPM LEL/O_2 METER 0.0 PPM
			(SP) POORLY GRADED SAND W/ GRAVEL		JAR #7	
	12.0		(CL) GRAY LEAN CLAY		JAR #8	
	15.0		(SP) POORLY GRADED SAND W/ GRAVEL & ORGANICS		JAR #9	NOA SAMPLE 15' - 16'
	18.0		BOTTOM OF BORING 16.0			HOLE GOUTED W/ 1 BAG GROUT
	21.0					

TABLE B-1 (13)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. H-2

Hole No. GH-2

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 2 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 1500
4. HOLE NO. (As shown on drawing title and file number) GH-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 17; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 5-2-94 5-3-94
7. THICKNESS OF OVERBURDEN 36.5	17. ELEVATION TOP OF HOLE 7.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 36.5	19. SIGNATURE OF INSPECTOR K. HOLOWAY

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			0.1' ASPHALT OVER (GM) BLACK SILTY GRAVEL W/ BRICK & WOOD FRAG.	0.8	JAR #1		26
			SAME	1.0	JAR #2		18
	3.0		SAME	1.5	JAR #3	HTW SITE CONTAMINATS UNKNOWN PPE LEVEL D MODIFIED	24
			(ML) TAN SILT W/ SAND	1.5	JAR #4		28
	6.0		SAME	1.5	JAR #5	▼	12
			NOT SAMPLED	0.0		PETRO. SMELL	4
	9.0		(SP) TAN POORLY GRADED SAND W/ SILT & GRAVEL	0.8	JAR #6		11
			(ML) BLACK SILT W/ GRAVEL, BRICK & WOOD FRAG.	0.6	JAR #7		8
	12.0		(GM) BROWN & GRAY SILTY GRAVEL	0.6	JAR #8	DRILLER SET 12' 4" CASING THEN DRILLED W/ 3 1/2" ROLLER BIT	>50
	13.5		END OF FILL NOT SAMPLED	0.0			8
	15.0		NOT SAMPLED	0.0		INT. G.W. ENC. AT d. 9.0	8
			(ML) GRAY SILT W/ SAND, WOOD, & BRICK FRAG.	0.6	JAR #9		13
	18.0		NOT SAMPLED	0.0			7
	21.0		(SP) GRAY POORLY GRADED SAND W/ SILT & WOOD FRAG.	1.1	JAR #10		15

TABLE B-1 (5A)

Hole No. GH-2

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 2 OF 2 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 1500
4. HOLE NO. (As shown on drawing title and file number) GH-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 17; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 5-2-94 5-2-94
7. THICKNESS OF OVERBURDEN 36.5	17. ELEVATION TOP OF HOLE 7.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 36.5	19. SIGNATURE OF INSPECTOR K. HOLOWAY

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	0.9	JAR #11	PETRO. SMELL	17
	13.5		END OF FILL (SP) GRAY POORLY GRADED SAND W/ SILT	0.8	JAR #12		18
	24.0		SAME	0.9	JAR #13		20
			SAME	0.6	JAR #14		16
	27.0		(SW) LT. GRAY WELL-GRADED W/ PEA GRAVEL	0.7	JAR #15		10
			SAME	0.7	JAR #16	PETRO. SMELL	18
	30.0						
	33.0						
	36.0		(GM) RED SILTY GRAVEL	1.3	JAR #17	PETRO. SMELL	75
			BOTTOM OF BORING @ 36.5'			GROUTED BORING W/ 6 BAGS OF GROUT	
	39.0						
	42.0						

TABLE B-1 (5B)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. GH-2

Hole No. GH-1

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 1500
4. HOLE NO. (As shown on drawing title and file number) GH-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 24; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-29-94 / 4-30-94
7. THICKNESS OF OVERBURDEN 61.5	17. ELEVATION TOP OF HOLE 6.7 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 61.5	19. SIGNATURE OF INSPECTOR K. HOLOWAY

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			0.1' ASPHALT OVER (GM) BLACK SILTY GRAVEL	0.4	JAR #1	HTW SITE CONTAMINATS UNKNOWN	- - -8
			SAME	0.4	JAR #2	PPE LEVEL D MODIFIED	8-8-8
	3.0		(ML) BLACK SILTY GRAVEL W/ BRICK FRAG.	0.0	JAR #3		5-4-3
			SAME	0.2	JAR #4	▼ INT. G.W. ENC. AT d. 5.0	3-3-2
	6.0		SAME	0.2	JAR #5		2-1-2
			NOT SAMPLED	0.0		MIX DRILLING MUD DRILLING W/ 4" FISHTAIL	2-1-1
	9.0		(GM) BLACK SILTY GRAVEL W/ SAND	0.5	JAR #6	PETRO. SMELL	1-1-1
			(GC) BLACK CLAYEY GRAVEL W/ BRICK & WOOD FRAG. (PETRO. SMELL & COLOR)	0.5	JAR #7		2-2-2
	12.0		SAME END OF FILL	0.5	JAR #8	PHOTOVAC 12.0 PPM	10-30-7
	13.5		(CL) GRAY LEAN CLAY W/ SAND	1.5	JAR #9	DRILLER SET 16' 4" CASING	6-5-_
	15.0		NOT SAMPLED	0.0		THEN DRILLED W/ 3 1/2" ROLLER BIT	4-4-5
			(ML) DK. GRAY SILT	1.5	JAR #10		6-7-6
	18.0		(SP) GRAY POORLY GRADED SAND W/ SILT & F PEA GRAVEL	0.9	JAR #11		6-6-7
	21.0		SAME	0.9	JAR #12	TABLE B-1 (4A)	7-5-10

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. GH-1

Hole No. GH-1

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 2 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 1500
4. HOLE NO. (As shown on drawing title and file number) GH-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 24; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-29-94 / 4-29-94
	17. ELEVATION TOP OF HOLE 6.7 ±
7. THICKNESS OF OVERBURDEN 61.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR K. HOLOWAY
9. TOTAL DEPTH OF HOLE 61.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	0.9	JAR #13		5-8-9
			SAME	0.8	JAR #14		6-9-9
	24.0		SAME	0.9	JAR #15		6-9-1[illegible]
			SAME	0.6	JAR #16		6-8-8
	27.0		SAME	0.7	JAR #17		10-6-4
			SAME W/ OIL SHEAM	0.7	JAR #18		4-7-1[illegible]
	30.0						
	33.0						
	36.0		(SW) GRAY WELL-GRADED SAND W/ GRAVEL	0.9	JAR #19		10-19-22
	39.0						
			(SP) GRAY POORLY GRADED SAND W/GRAVEL OVER 0.2' (CL) RED LEAN CLAY (OIL SHEAM PRESENT)	1.2	JAR #20		13-12-12
	42.0						

TABLE B-1 (4B)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. GH-1

Hole No. GH-1

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 3 OF 3 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 1500
4. HOLE NO. (As shown on drawing title and file number) GH-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 24; UNDISTURBED 0
5. NAME OF DRILLER C. MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-29-94 4-30-94
	17. ELEVATION TOP OF HOLE 6.7 ±
7. THICKNESS OF OVERBURDEN 61.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR K. HOLLOWAY
9. TOTAL DEPTH OF HOLE 61.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(ML) RED SILT W/ F SAND	1.2	JAR #21		16-26-28
	48.0		SAME	1.1	JAR #22		8-21-28
	54.0		(SM) RED SILTY F SAND P.P. = 1.00TSF	1.1	JAR #23		16-28-31
	57.0						
	60.0		SAME	1.1	JAR #24	TABLE B-1 (4C)	17-29-38
	63.0		BOTTOM OF BORING 71.5'			BORING GROUTED W/ 6 BAGS OF GROUT	

Hole No. WTH-4

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT 6" NOM O.D. HSA	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY WARREN GEORGE, INC.		12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO. (As shown on drawing title and file number)	WTH-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 15 / UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN		14. TOTAL NUMBER CORE BOXES	
		15. ELEVATION N/A	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.		16. DATE HOLE	2-3-95 / 2-3-95
7. THICKNESS OF OVERBURDEN	>30 FT.	17. ELEVATION TOP OF MUDLINE -12.4 FT±	
8. DEPTH DRILLED INTO ROCK	0.0	18. TOTAL CORE RECOVERY FOR BORING	N/A
9. TOTAL DEPTH OF HOLE	30	19. INSPECTOR(S) M. TORSIELLO	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			(OH) DARK GRAY ORGANIC CLAY, TRACE TRACE FINE GRAVEL, FREQUENT ORGANIC FIBERS, WET, VERY SOFT, FREQUENTLY STAINED BLACK, STRONG PHC ODOR			OVM SCREEN OF SS = 0.2.1 ppm WOR/2 FT
	4.0					OVM SCREEN OF SS = 0,0.3,0.9 ppm WOR/2 FT
						OVM SCREEN OF SS = 0.0,0.9,0.0,10.2 ppm WOR/2 FT
					S-1	OVM SCREEN OF SS = 0.3,0.3,0.9,2.1 ppm WOR/2 FT
	8.0					OVM SCREEN OF SS = 0.9,0.9,2.1,8.3 ppm WOR/2 FT
						OVM SCREEN OF SS = 2.1,4.0,4.6 ppm WOR/2 FT
	12.0		(SC) DARK GRAY COARSE TO FINE SAND AND ORGANIC CLAY, TRACE FINE GRAVEL WET, LOOSE, FREQUENTLY STAINED BLACK STRONG PHC ODOR		S-2	OVM SCREEN OF SS = 2.3 ppm 2-2-4-4
			(SP) DARK GRAY AND BROWN COARSE TO FINE SAND, TRACE FINE GRAVEL, TRACE CLAYEY SILT, WET, MEDIUM DENSE WEAK PHC ODOR		S-3	OVM SCREEN OF SS = 4.0 ppm 4-6-6-8
	16.0				S-4	OVM SCREEN OF SS = 2.1 ppm 7-8-9-9
			(CL) YELLOWISH RED SILTY CLAY, TRACE FINE SAND, WET, VERY STIFF		S-5	OVM SCREEN OF SS = 0.0 ppm 9-11-11-15
	20.0				S-6	10-12-13-16
			(SM) YELLOWISH RED FINE SAND AND SILT, WET, MEDIUM DENSE		S-7	OVM SCREEN OF SS = 0.0 ppm 14-14-15-17
	24.0		(CL) YELLOWISH RED SILTY, CLAY AND COARSE TO FINE GRAVEL (SHALE) WET, TO FINE GRAVEL (SHALE) WET, HARD		S-8	OVM SCREEN OF SS = 0.0 ppm 13-17-14-14
			(SM) YELLOWISH RED FINE SAND AND SILT OCCASIONAL POCKETS OF SILTY CLAY, WET, MEDIUM DENSE		S-9	OVM SCREEN OF SS = 0.0 ppm 8-8-9-12
	28.0					

ENG FORM 1836 | PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK | HOLE NO. WTH-4

Hole No WTH-4

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 9" NOM O.D HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WTH-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 2-3-95 2-3-95
7. THICKNESS OF OVERBURDEN >30 FT.	17. ELEVATION TOP OF MUDLINE -12.4 FT±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 30	19. SIGNATURE OF INSPECTOR(S) M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			SEE ABOVE		S-10	8-10-13-17
	32.0		NOTES 1 BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-3-95 2 SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 14.5 FT AND 17.4 FT DURING DRILLING 3 BOREHOLE TREMIE GROUTED WITH CEMENT/BENTONITE GROUT. 4 ENVIRONMENTAL SAMPLES COLLECTED AS FOLLOWS: a) WTH-4A, 0'-6', COMPOSITE b) WTH-4A, 5.5'-6', DISCRETE c) WTH-4B, 6'-12', COMPOSITE d) WTH-4B, 9.5'-10', DISCRETE			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. WTH-4A

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 1 SHEET

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT 8" NOM. O.D. HSA	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY WARREN GEORGE, INC.		12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO. (As shown on drawing title and file number)	WTH-4A	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 0 / UNDISTURBED 2
5. NAME OF DRILLER J. GORMAN		14. TOTAL NUMBER CORE BOXES	
		15. ELEVATION N/A	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT		16. DATE HOLE	2-8-95 / 2-8-95
		17. ELEVATION TOP OF MUDLINE -12.0 FT±	
7. THICKNESS OF OVERBURDEN	>8.0 FT.	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0 FT	19. INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO	
9. TOTAL DEPTH OF HOLE	8.0 FT		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
	4.0		(OH/CH) DARK GRAY ORGANIC CLAY, TRACE FINE GRAVEL, FREQUENT ORGANIC FIBERS, VERY SOFT, WET, STRONG PHC ODOR, FREQUENTLY STAINED BLACK PP=0.06 TSF; TOR=0.10 TSF GRADING WITH LITTLE FINE SAND		U-1	OSTERBERG SAMPLE, 3" O.D. TUBE, 4-6 FT, 24.5" RECOVERY
					U-2	OSTERBERG SAMPLE, 3" O.D. TUBE, 6-8 FT, 14" RECOVERY
	8.0		(SP) DARK GRAY COARSE TO FINE SAND TRACE FINE GRAVEL, TRACE SILT, WET, LOOSE			
	12.0					
	16.0					
	20.0					
	24.0					
	28.0					

NOTES:
1. BORING TERMINATED AT THE DEPTH OF 8.0 FEET BML ON 2-8-95.
2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 12.5 AND 14.5' DURING DRILLING.
3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-8-95.

Hole No. NKG-10

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-10	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 28 — UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-22-94 — 3-22-94
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 7.3 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			ASPHALT PARKING LOT				
			CRUSHSTONE BASE COARSE MAT'L				
			(GM) BLACK SILTY GRAVEL W/ SAND	0.7	JAR #1		-20-45
			(SM) BLACK AND GRAY SILTY SAND	0.5	JAR #2		8-12-10
	3.0		(SP) RED POORLY GRADED SAND W/ LITTLE OF GRAVEL	0.5	JAR #3		4-6-5
			SAME	0.7	JAR #4		4-5-5
	6.0		SAME	0.7	JAR #5		4-5-6
			SAME	0.5	JAR #6		2-6-5
	9.0		SAME	0.8	JAR #7		9-11-7
			(CL) GRAY SILTY CLAY W/ GRAVEL & WOOD FIBERS	0.6	JAR #8		9-13-10
	12.0		SAME	0.6	JAR #9		3-6-5
	13.5		END OF FILL				
			SAME	1.0	JAR #10	DRILLER SET 23' 4" CASING MX POLY-SAL	2-2-3
	15.0		(ML) RED CLAYEY SILT	1.0	JAR #11		2-2-3
			SAME	1.1	JAR #12	INT. G.W. ENC. AT d. 7.5 STATIC W.L. AT d. 5.7 AFTER 0.5 HRS.	1-3-3
	18.0		(GM) LT. RED SILTY GRAVEL W/ SAND	0.8	JAR #13		5-5-3
			SAME	0.3	JAR #14	TABLE B-1 (29A)	1-2-5
	21.0						

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-10

00901-37

Hole No. NKG-10

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-10	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 28; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [Y] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-22-94 3-24-94
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 7.3 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT.
			(ML) RED CLAYEY SILT	0.5	JAR #15	3-5-5
	24.0		(SM) RED SILTY F SAND W/ GRAVEL	1.1	JAR #16	5-9-13
			SAME	0.7	JAR #17	8-17-18
	27.0		(ML) RED CLAYEY SILT W/ GRAVEL	1.1	JAR #18	5-10-18
			(ML) RED CLAYEY SILT	1.3	JAR #19	10-15-17
			SAME	0.9	JAR #20	5-15-19
	30.0					
	33.0					
			(ML) RED CLAYEY SILT W/ SAND	1.3	JAR #21	11-18-21
	36.0					
	39.0					
			(SP) RED POORLY GRADED SAND W/ CLAYEY SILT LENSES	1.2	JAR #22	11-17-21
	42.0					

TABLE B-1 (29B)

Hole No. NKG-10

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-10
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	71.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	71.5
10. SIZE AND TYPE OF BIT	5" AUGER & 3 1/2" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314-C
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 28 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	3-22-94 / 3-23-94
17. ELEVATION TOP OF HOLE	7.3 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	45.0		(SM) RED SILTY SAND W/ CLAYEY SILT AND CEMENTED SANDSTONE LENSES	0.5	JAR #23	9-18-20
	48.0					
	51.0		(ML) RED CLAYEY SILT W/ WEATHERED ROCK FRAG.	0.9	JAR #24	17-25-36
	54.0					
			SAME	0.9	JAR #25	15-23-33
	57.0					
	60.0		(ML) RED CLAYEY SILT W/ TR. GRAVEL	1.0	JAR #26	17-25-37
	63.0					

TABLE B-1 (29C)

ENG FORM 1836 | PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-10

DRILLING LOG	DIVISION ORD	INSTALLATION NED	Hole No. NKG-10

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RE	SHEET 4 OF 4 SHEETS
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY MOBILE DISTRICT		12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C	
4. HOLE NO. (As shown on drawing title and file number) NKG-10		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 28 / UNDISTURBED 0
5. NAME OF DRILLER J. BUSH		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUNDWATER	
		16. DATE HOLE	3-22-94 / 3-23-94
7. THICKNESS OF OVERBURDEN	71.5	17. ELEVATION TOP OF HOLE 7.3 ±	
8. DEPTH DRILLED INTO ROCK	0.0	18. TOTAL CORE RECOVERY FOR BORING	N/A
9. TOTAL DEPTH OF HOLE	71.5	19. SIGNATURE OF INSPECTOR J. CHILDESS	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		SAME	1.2	JAR #27	15-18-21
	69.0		(ML) RED CLAYEY SILT	1.2	JAR #28	13-27-29
	71.5					
	72.0		BOTTOM OF BORING 71.5'			TREMMIE GROUTED HOLE W/ 6 BAGS OF GROUT
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (29D)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-10

00901-40

Hole No. NKG-10 U

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 1 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-10 U	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 0 — UNDISTURBED 2
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-05-94 — 4-05-94
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN 19.4	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR K. HOLOWAY
9. TOTAL DEPTH OF HOLE 19.4	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) SPT BLOWS/FT g
	3.0					
	6.0					
	9.0					
	12.0		(CL) DK. GRAY LEAN CLAY CF SAND		SAMPLE #1	UNDISTURBED SAMPLE
	15.0					
	18.0		(GM) BROWN SILTY GRAVEL UP TO 1.5" IN BOTTOM		SAMPLE #2	UNDISTURBED SAMPLE
			BOTTOM OF BORING 19.4'			
	21.0					

TABLE B-1 (29E)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-10 U

00901-41

Hole No WT-4

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WT-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	16. DATE HOLE 2-2-95 2-2-95
	17. ELEVATION TOP OF MUDLINE -9.4 FT±
7. THICKNESS OF OVERBURDEN >30 FT	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0 FT.	19. INSPECTOR(S) M. TORSIELLO
9. TOTAL DEPTH OF HOLE 30 FT.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			(OH&GP) DARK GRAY ORGANIC CLAY AND COARSE TO FINE GRAVEL,TRACE COARSE TO FINE SAND, WET, VERY SOFT, STRONG PHC ODOR, FREQUENTLY STAINED BLACK		S-1	OVM SCREEN OF SS = 0.9 ppm	WOR/2 FT
					S-2		WOR/2 FT
	4.0		GRADING TO MEDIUM STIFF		S-3	OVM SCREEN OF SS = 0.0 ppm	3-3-4-4
			(SP) DARK BROWN COARSE TO FINE SAND, LITTLE MEDIUM TO FINE GRAVEL TRACE SILT, WET, LOOSE, PHC ODOR		S-4	OVM SCREEN OF SS = 0.0 ppm	1-3-4-4
	8.0		GRADING TO YELLOWISH RED, AND COARSE TO FINE GRAVEL WITH WEAK PHC ODOR		S-5	OVM SCREEN OF SS = 0.0 ppm	12-17-17-22
			GRADING WITH TRACE SILTY CLAY TO MEDIUM DENSE		S-6	OVM SCREEN OF SS = 0.0 ppm	14-14-15-17
	12.0		GRADING TO YELLOWISH RED WITH TRACE FINE GRAVEL		S-7	OVM SCREEN OF SS = 0.0 ppm	5-6-8-8
			(SM) YELLOWISH RED COARSE TO FINE SAND AND CLAYEY SILT, WET, MEDIUM DENSE		S-8	OVM SCREEN OF SS = 0.0 ppm	8-8-10-8
	16.0		GRADING TO DENSE WITH LITTLE MEDIUM TO FINE GRAVEL, TRACE SILT		S-9		9-19-15-16
			(ML) YELLOWISH RED SILT, TRACE FINE SAND, WET, HARD		S-10		15-14-22-19
	20.0		GRADING WITH LITTLE FINE SAND		S-11		5-6-8-9
			GRADING WITH SOME FINE SAND TO MEDIUM STIFF		S-12		6-6-6-7
	24.0		GRADING TO STIFF		S-13		9-11-14-16
			GRADING TO HARD, AND FINE SAND		S-14		16-18-18-17
	28.0						

Hole No. WT-4

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RRIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WT-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	16. DATE HOLE: 2-2-95 | 2-2-95
7. THICKNESS OF OVERBURDEN >30 FT.	17. ELEVATION TOP OF MUDLINE -9.4 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 30 FT.	19. SIGNATURE OF INSPECTOR(S) M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN.
			(SM) YELLOWISH RED FINE SAND, LITTLE SILT, WET, MEDIUM DENSE		S-15	OVM SCREEN OF SS = 0.0 ppm 10-12-13-12
	32.0		NOTES 1. BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-2-95 2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 11.0 FT AND 13.5 DURING DRILLING. 3. BOREHOLE GROUTED WITH CEMENT/BENTONITE GROUT ON 2-2-95.			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. NKG-9

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-9
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	71.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	71.5
10. SIZE AND TYPE OF BIT	5" AUGER & 3 1/2" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTURER'S DESIGNATION OF DRILL	FAILING 314-C
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 31 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	3-24-94 / 3-25-94
17. ELEVATION TOP OF HOLE	8.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			~~ASPHALT PARKING LOT~~ ~~AGGREGATE BASE COARSE MATL~~				
			(ML) BLACK SILT W/ GRAVEL & SAND	0.4	JAR #1		-30-22
			(ML) W/GRAVEL 1" MAX SILT SAND MIX- BLACK	0.9	JAR #2		4-3-9
	3.0		W/TR. CEMENTED SANDSTONE LENSE RED	0.3	JAR #3		3-3-3
			(SP) LT. RED POORLY GRADED SAND W/ GRAVEL & WOOD FIBERS (DAMP)	0.4	JAR #4		1-1-4
	6.0		(SM) BROWN SILTY SAND, W/ WOOD FIBERS	0.3	JAR #5		wh-wh-1
			SAME	0.4	JAR #6		47-6-4
	9.0		(SM) GRAY SILTY SAND, W/ GRAVEL & WOOD FIBERS	0.4	JAR #7		1-1-wh
			(ML) GRAY CLAYEY SILT W/ WOOD FIBERS	0.7	JAR #8		wh-wh-
	12.0		SAME	1.1	JAR #9		wh-wh-1
			SAME	1.2	JAR #10	DRILLER SET 23' 4" CASING MX POLY-SAL AT 22.5'	wh-1-1
	15.0		(ML) REDDISH GRAY SILT W/ SAND & GRAVEL TR. WOOD FIBERS	0.9	JAR #11	INT. G.W. ENC. AT d. 21.0 STATIC W.L. AT d. 17.0 AFTER 2 HRS.	1-2-4
			SAME	0.7	JAR #12		5-6-5
	18.0		SAME W/ FINE GRAVEL	0.9	JAR #13		9-11-13
			SAME	0.8	JAR #14		17-11-11
	21.0						

TABLE B-1 (28A)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-9

Hole No. NKG-9

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 31; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-24-94 3-25-94
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 8.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR J. CHILDESS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	0.6	JAR #15		5-7-9
	24.0		SAME	0.4	JAR #16		3-3-3
			SAME	0.7	JAR #17		5-5-8
			END OF FILL (SP) RED POORLY GRADED SAND W/ SILT & GRAVEL	0.6	JAR #18		7-9-13
	27.0		(SP) RED POORLY GRADED SAND W/ CLAYEY SILT & GRAVEL	0.6	JAR #19		5-7-9
			SAME	1.1	JAR #20		5-8-9
	30.0		(SM) RED SILTY F SAND	1.3	JAR #21		8-12-15
			SAME	1.2	JAR #22		5-8-12
	33.0		SAME	1.1	JAR #23		8-12-13
			SAME	1.1	JAR #24		8-9-9
	36.0						
	39.0						
			(ML) RED CLAYEY SILT	0.7	JAR #25		7-9-9
	42.0						

TABLE B-1 (28B)

Hole No. NKG-9

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RE
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 31; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-24-94 3-25-94
	17. ELEVATION TOP OF HOLE 8.0 ±
7. THICKNESS OF OVERBURDEN 71.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR J. CHILDESS
9. TOTAL DEPTH OF HOLE 71.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	45.0					
			(SM) RED SILTY F SAND	0.8	JAR #26	6-9-6
	48.0					
	51.0		(ML) RED SILT FINE GRAVEL	1.2	JAR #27	9-29-30
	54.0					
			(ML) CLAYEY SILT W/ TR. WEATHERED ROCK FRAG.	1.1	JAR #28	12-15-18
	57.0					
	60.0		(SM) RED SILTY SAND	0.8	JAR #29	9-16-14
	63.0					

TABLE B-1 (28C)

Hole No. NKG-9

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/2" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 31; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 3-24-94 3-24-94
	17. ELEVATION TOP OF HOLE 8.0 ±
7. THICKNESS OF OVERBURDEN 71.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR J. CHILDESS
9. TOTAL DEPTH OF HOLE 71.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		(SM) RED SILTY SAND W/ WEATHERED ROCK FRAG.	0.3	JAR #30	20-40-32
	69.0					
	71.5		(SM) RED SILTY F SAND		JAR #31	
	72.0		BOTTOM OF BORING 71.5'			
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (28D)

Hole No. NKG-8

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 27; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-11-94 4-11-94
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 3.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR K. HOLOWAY

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(ML) BROWN SILT W/ SAND & ROCK & BRICK FRAG.	0.7	JAR #1		5-8-10
	3.0		SAME	0.9	JAR #2		6-5-4
			SAME	0.6	JAR #3		4-3-2
	6.0		SAME	1.0	JAR #4		2-4-5
			SAME	1.1	JAR #5		4-5-7
	9.0		SAME	1.1	JAR #6	▼	6-6-7
			(SM) REDDISH BROWN SILTY SAND W/ GRAVEL & CLAY (TR WOOD FRAG.)	1.1	JAR #7		3-9-4
	12.0		SAME	1.0	JAR #8	DRILLER SET 12' 4" CASING THEN DRILLED W/ 3 1/2" ROLLER BIT	4-4-5
	13.5		SAME END OF FILL	1.0	JAR #9		10-16-7
			DK. GRAY LEAN CLAY W/ LAYERS OF SAND	0.7	JAR #10		2-2-6
	15.0		(SM) REDDISH BROWN SILTY SAND W/ GRAVEL	0.6	JAR #11	INT. G.W. ENC. AT d. 9.0	13-16-27
			SAME	0.8	JAR #12		13-11-13
	18.0		(GM) BROWN SILTY GRAVEL	0.7	JAR #13		13-8-13
	21.0		SAME	0.4	JAR #14	TABLE B-1 (27A)	10-11-11

Hole No. NKG-8

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C
4. HOLE NO. (As shown on drawing title and file number) NKG-8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 27; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 4-11-94 — 4-11-94
	17. ELEVATION TOP OF HOLE 3.0 ±
7. THICKNESS OF OVERBURDEN 71.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR K. HOLLOWAY
9. TOTAL DEPTH OF HOLE 71.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT.
	45.0						
			(SP) REDDISH BROWN F SAND W/ SILT	1.5	JAR #22		10-14-18
	48.0						
	51.0		SAME	0.6	JAR #23		20-15-22
	54.0						
			(CL) REDDISH BROWN LEAN CLAY P.P. = 1.00TSF	1.5	JAR #24		5-8-14
	57.0						
	60.0		(ML) REDDISH BROWN SILT	1.5	JAR #25		11-17-36
	63.0						

TABLE B-1 (27C)

Hole No. NKG-8

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY MOBILE DISTRICT		12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314-C	
4. HOLE NO. (As shown on drawing title and file number)	NKG-8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 27 / UNDISTURBED 0
5. NAME OF DRILLER J. BUSH		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUNDWATER	
		16. DATE HOLE	4-11-94 / 4-11-94
		17. ELEVATION TOP OF HOLE	3.0 ±
7. THICKNESS OF OVERBURDEN	71.5	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0	19. SIGNATURE OF INSPECTOR K. HOLLOWAY	
9. TOTAL DEPTH OF HOLE	71.5		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		(SM) REDDISH BROWN SILT W/ SILT	1.5	JAR #22	8-8-9
	69.0		(ML) REDDISH BROWN SILT W/ SILT	1.5	JAR #23	16-22-27
	72.0		BOTTOM OF BORING 71.5'			HOLE GROUTED W/ 6 BAGS OF GROUT
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (27D)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-8

00901-50

Hole No WTH-3

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1 PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10 SIZE AND TYPE OF BIT 8" NOM O.D HSA
2 LOCATION (Coordinates or Station) SEE SITE PLAN	11 DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3 DRILLING AGENCY WARREN GEORGE, INC.	12 MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4 HOLE NO. (As shown on drawing title and file number) WTH-3	13 TOTAL NO OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 17; UNDISTURBED 0
5 NAME OF DRILLER J GORMAN	14 TOTAL NUMBER CORE BOXES
6 DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15 ELEVATION N/A
	16 DATE HOLE 2-9-95 2-9-95
	17 ELEVATION TOP OF MUDLINE -5.5 FT±
7 THICKNESS OF OVERBURDEN >34 FT.	18 TOTAL CORE RECOVERY FOR BORING N/A
8 DEPTH DRILLED INTO ROCK 0.0 FT.	19 INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO
9 TOTAL DEPTH OF HOLE 34 FT.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			(OH) DARK GRAY ORGANIC CLAY AND COARSE TO FINE GRAVEL, SOFT, WET WEAK PHC ODOR, FREQUENTLY STAINED BLACK		S-1	OVM SCREEN OF SS = 1.7 ppm	WOR/2 FT
			(GC) DARK GRAY COARSE TO FINE GRAVEL AND ORGANIC CLAY, VERY LOOSE, PHC ODOR, STAINED BLACK			OVM SCREEN OF SS = 0.0 ppm	WOR/2 FT
	4.0		GRADING TO LOOSE			OVM SCREEN OF SS = 1.5 ppm	2-3-4-1
			GRADING WITH SOME COARSE TO FINE SAND				4-4-3-2
	8.0		GRADING TO VERY LOOSE				WOR/2 FT
			(OH) DARK GRAY ORGANIC CLAY, TRACE FINE GRAVEL, WET, VERY SOFT, SHEEN ON SAMPLE, PHC ODOR			OVM SCREEN OF SS = 4.5 ppm	WOR/2 FT
	12.0		(SP) DARK GRAY COARSE TO FINE SAND AND COARSE TO FINE GRAVEL, TRACE SILT, WET, LOOSE, WEAK PHC ODOR		S-2	OVM SCREEN OF SS = 0.0 ppm	9-4-3-5
			GRADING TO MEDIUM DENSE WITH LITTLE FINE GRAVEL		S-3	OVM SCREEN OF SS = 0.0 ppm	5-9-12-14
	16.0		(SM) YELLOWISH RED FINE SAND, LITTLE SILT, WET, MEDIUM DENSE		S-4	OVM SCREEN OF SS = 0.0 ppm	6-10-11-13
					S-5	OVM SCREEN OF SS = 0.0 ppm	8-7-9-15
	20.0				S-6	OVM SCREEN OF SS = 0.0 ppm	13-12-13-21
					S-7	OVM SCREEN OF SS = 0.0 ppm	11-9-10-8
	24.0		(CL) YELLOWISH RED SILTY CLAY, WET, STIFF		S-8	OVM SCREEN OF SS = 0.0 ppm	13-8-5-8
			(ML) YELLOWISH RED CLAYEY SILT, WET STIFF		S-9	OVM SCREEN OF SS = 0.0 ppm	7-7-7-8
	28.0						

Hole No. WTH-3

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WTH-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 17; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION N/A
	16. DATE HOLE 2-9-95 2-9-95
7. THICKNESS OF OVERBURDEN >34 FT.	17. ELEVATION TOP OF MUDLINE -5.5 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 34 FT.	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			SEE ABOVE		S-10	10-16-25-36
			(SM) DARK BROWN COARSE TO FINE SAND, TRACE FINE GRAVEL, TRACE SILT, OCCASIONAL POCKETS OF CLAYEY SILT		S-11	18-20-26-32
	32.0		GRADING TO YELLOWISH RED FINE SAND AND SILT		S-12	OVM SCREEN OF SS = 0.0 ppm 19-23-25-31
	36.0		NOTES 1. BORING TERMINATED AT THE DEPTH OF 34.0 FEET BML ON 2-9-95. 2. SURFACE WATER THICKNESS APPROXIMATELY 8.5 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-9-95. 4. ENVIRONMENTAL SAMPLES COLLECTED AS FOLLOWS: a) WTH-3A, 0-6', COMPOSITE b) WTH-3A, 0-2', DISCRETE c) WTH-3B, 6-12', COMPOSITE d) WTH-3B, 11-12', DISCRETE			
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. H-1

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 1 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	H-1
5. NAME OF DRILLER	MOON
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	16.0
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	16.0
10. SIZE AND TYPE OF BIT	5" AUGER & 3 1/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 8 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	6-20-94 / 6-20-94
17. ELEVATION TOP OF HOLE	4.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	M. ROGALSKI

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
			(GW) BROWN WELL-GRADED GRAVEL W/ SAND (FILL)		JAR #1	PHOTOVAC 0.0 PPM 11-14-20-12
	3.0		SAME		JAR #2	PHOTOVAC 0.0 PPM 17-8-5-[illegible]
			SAME		JAR #3	PHOTOVAC 0.0 PPM 7-9-12-[illegible]
	6.0		SAME		JAR #4	VOA COLLECTED 7' TO 7.5' PHOTOVAC 0.0 PPM 8-9-8-12
	9.0		(GW) REDDISH BROWN WELL-GRADED GRAVEL W/ SAND		JAR #5	PHOTOVAC 0.0 PPM 9-12-6-[illegible]
			SAME		JAR #6	PHOTOVAC 0.0 PPM 4-2-3-5
	12.0		SAME		JAR #7	PHOTOVAC 0.0 PPM VOA COLLECTED 14' TO 15' 11-8-5-7
	15.0		(GW) BROWN & GRAY WELL-GRADED GRAVEL W/ SAND		JAR #8	PHOTOVAC 0.0 PPM 28-12-14-17
			BOTTOM OF BORING 16.0			HOLE GOUTED W/ 1 BAG GROUT
	18.0					
	21.0					

TABLE B-1 (12)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. H-1

00901-53

Hole No. NKG-7

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 1 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-7
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	13.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	13.5
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 9 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-19-93 / 11-19-93
17. ELEVATION TOP OF HOLE	5.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(GM) DK. GRAY SILTY GRAVEL W/ CRUSHSTONE & BRICK FRAG.	1.1	JAR #1		44
			SAME	1.2	JAR #2		31
	3.0		(SM) DK. GRAY SILTY SAND W/ GLASS, DECWOOD, & BRICK FRAG.	1.2	JAR #3		14
			SAME	1.3	JAR #4	BORING NKG-7 WAS TERMINATED AT d. 13.5. PETROLEUM OIL IN SAMPLE	3
	6.0		SAME	0.6	JAR #5		4
			SAME	0.8	JAR #6	INT. G.W. ENC. AT d. 12.0 STATIC W.L. AT d. 8.6 AFTER 1 HRS.	5
	9.0		(SM) DK. GRAY SILTY SAND W/ CRUSHSTONE, GLASS, & CINDERS	0.7	JAR #7		5
			(GM) DK. GRAY SILTY GRAVEL (PETROLEUM OIL IN SAMPLE)	1.3	JAR #8	▼	15
	12.0		END OF FILL				
	12.5		(SM) BROWN SILTY SAND W/ ROCK FRAG.	1.2	JAR #9		28
	13.5		BOTTOM OF BORING 13.5'				
	15.0			1.2			21
				1.3			30
	18.0			1.4			34
				1.2			14
	21.0			1.3			13

TABLE B-1 (26A)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-7

Hole No. NKG-5

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-6
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	76.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	76.5
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTURER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 29 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-18-93 / 11-19-93
17. ELEVATION TOP OF HOLE	4.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(SM) BLACK SILTY SAND W/ SOME GRAV., CRUSHSTONE, & ASPHALT	1.2	JAR #1		17
			SAME	1.3	JAR #2		18
	3.0		SAME	0.8	JAR #3		17
			(ML) TAN & BLACK CLAYEY SANDY SILT W/ TR. COAL FRAG. END OF FILL	1.2	JAR #4		13
	6.0		(SM) BROWN SILTY SAND W/ TR. ROCK FRAG.	1.3	JAR #5		12
			SAME	1.2	JAR #6		7
	9.0		SAME	1.2	JAR #7		11
			SAME	1.1	JAR #8		11
	12.0		(GM) BROWN SILTY GRAVEL	1.3	JAR #9		14
			SAME	1.2	JAR #10	DRILLER SET 21' 4" CASING MX POLY-SAL AT 21.0'	21
	15.0		SAME	1.3	JAR #11	INIT. G.W. ENC. AT d. 13.5 STATIC W.L AT d. 11.6 AFTER 1 HRS.	30
			(ML) BROWN CLAYEY SILT W/ TR. GRAVEL	1.4	JAR #12		34
	18.0		SAME	1.2	JAR #13		14
			SAME	1.3	JAR #14		13
	21.0						

TABLE B-1 (25A)

ENG FORM 1836 PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK HOLE NO. NKG-6

00901-55

Hole No. NKG-6

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-6	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 29; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-18-93 11-19-93
7. THICKNESS OF OVERBURDEN 76.5	17. ELEVATION TOP OF HOLE 4.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 76.5	19. SIGNATURE OF INSPECTOR D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(ML) BROWN CLAYEY SILT F GRAVEL	1.3	JAR #15		22
	24.0		SAME	1.4	JAR #16		21
			(ML) BROWN CLAYEY SILT W/ F. SAND	1.4	JAR #17		46
	27.0		(ML) BROWN CLAYEY SILT	1.5	JAR #18		21
			SAME	1.5	JAR #19		20
	30.0		SAME	1.0	JAR #20		32
	33.0						
	36.0		(ML) BROWN CLAYEY SILT	1.2	JAR #21		27
	39.0						
	42.0		SAME	1.3	JAR #22		29

TABLE B-1 (25B)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-6

00901-56

Hole No. NKG-6

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY MOBILE DISTRICT		12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314	
4. HOLE NO. (As shown on drawing title and file number)	NKG-6	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 29 / UNDISTURBED 0
5. NAME OF DRILLER J. BUSH		14. TOTAL NUMBER CORE BOXES	
		15. ELEVATION GROUNDWATER	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		16. DATE HOLE	11-18-93 / 11-19-93
		17. ELEVATION TOP OF HOLE 4.0 ±	
7. THICKNESS OF OVERBURDEN	76.5	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0	19. SIGNATURE OF INSPECTOR D. JONES	
9. TOTAL DEPTH OF HOLE	76.5		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(ML) BROWN CLAYEY SILT	1.4	JAR #23		38
	48.0		SAME	1.0	JAR #24		30
	51.0		SAME	1.0	JAR #25		31
	54.0		BROWN CLAYEY SILT W/ F SAND	1.0	JAR #26		35
	57.0						
	60.0						
	63.0						

TABLE B-1 (25C)

Hole No. NKG-6

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-6	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 29; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-18-93 / 11-19-93
7. THICKNESS OF OVERBURDEN 76.5	17. ELEVATION TOP OF HOLE 4.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 76.5	19. SIGNATURE OF INSPECTOR D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	66.0		SAME	1.1	JAR #27		33
	69.0		SAME	1.5	JAR #28		19
	72.0						
	75.0		SAME	1.5	JAR #29		22
	76.5		BOTTOM OF BORING 76.5'				
	78.0						
	81.0						
	84.0						

TABLE B-1 (25D)

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WT-3

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT 8" NOM O.D HSA	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY WARREN GEORGE, INC.		12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO. (As shown on drawing title and file number)	WTH-10	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 18 / UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		15. ELEVATION N/A	
		16. DATE HOLE	2-8-95 / 2-8-95
7. THICKNESS OF OVERBURDEN	>36 FT.	17. ELEVATION TOP OF MUDLINE	-7.2 FT±
8. DEPTH DRILLED INTO ROCK	0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING	N/A
9. TOTAL DEPTH OF HOLE	36 FT.	19. INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g / SPT BLOWS/6 IN
			(OH) DARK GRAY ORGANIC CLAY, FREQUENT ORGANIC FIBERS, WET, VERY SOFT, STAINED BLACK, STRONG PHC ODOR		S-1	OVM SCREEN OF SS = 0.3 ppm WOR/2 FT
					S-2	OVM SCREEN OF SS = 0.3 ppm WOR/2 FT
	4.0		GRADING WITH LITTLE FINE GRAVEL, TRACE COARSE TO FINE SAND		S-3	OVM SCREEN OF SS = 0.3 ppm WOR/2 FT
					S-4	OVM SCREEN OF SS = 0.3 ppm WOR/2 FT
	8.0				S-5	OVM SCREEN OF SS = 0.3 ppm WOR/2 FT
			(SM) YELLOWISH RED AND DARK BROWN FINE SAND, LITTLE SILT, LITTLE MEDIUM FINE GRAVEL, WET, DENSE, WEAK PHC ODOR		S-6	OVM SCREEN OF SS = 0.0 ppm 10-12-23-19
	12.0		GRADING TO MEDIUM DENSE WITH TRACE COARSE TO MEDIUM SAND		S-7	OVM SCREEN OF SS = 0.0 ppm 13-12-13-13
			GRADING WITHOUT DARK BROWN		S-8	OVM SCREEN OF SS = BDL 12-9-8-8
	16.0		GRADING TO DENSE			NO RECOVERY 19-18-17-15
					S-9	OVM SCREEN OF SS = 0.0 ppm 26-22-22-20
	20.0		(CL) YELLOWISH RED SILTY CLAY, TRACE FINE SAND, WET, HARD		S-10	OVM SCREEN OF SS = 0.0 ppm 25-23-23-26
					S-11	OVM SCREEN OF SS = 0.0 ppm 13-16-17-18
	24.0				S-12	OVM SCREEN OF SS = 0.0 ppm 16-22-25-18
					S-13	OVM SCREEN OF SS = 0.0 ppm 22-21-18-20
	28.0					

Hole No. WT-3

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" NOM O.D.HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WTH-10	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 18; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	16. DATE HOLE 2-8-95 2-8-95
7. THICKNESS OF OVERBURDEN >36 FT.	17. ELEVATION TOP OF MUDLINE -7.2 FT±
8. DEPTH DRILLED INTO ROCK 0.0 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 36 FT.	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			GRADING TO MEDIUM STIFF WITH LITTLE MEDIUM TO FINE GRAVEL, TRACE COARSE TO FINE SAND		S-14	OVM SCREEN OF SS = 0.0 ppm	5-2-5-13
			GRADING WITH INTERBEDDED SILTY CLAY AND FINE SAND, TRACE COARSE, TO MEDIUM SAND, WITHOUT GRAVEL, HARD		S-15		15-18-20-22
	32.0		GRADING WITH TRACE FINE GRAVEL		S-16		17-20-21-23
					S-17	OVM SCREEN OF SS = 0.0 ppm	26-32-36-74
	36.0		NOTES: 1. BORING TERMINATED AT THE DEPTH OF 36.0 FEET BML ON 2-8-95. 2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 6.5 FT AND 10.0 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT/BENTONITE GROUT ON 2-8-95.				
	40.0						
	44.0						
	48.0						
	52.0						
	56.0						

Hole No WT-3A

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 1 SHEET

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT 8" NOM O.D HSA	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY WARREN GEORGE, INC.		12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO. (As shown on drawing title and file number)	WT-3A	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 0 / UNDISTURBED 3
5. NAME OF DRILLER J. GORMAN		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.		15. ELEVATION N/A	
		16. DATE HOLE	2-13-95 / 2-13-95
		17. ELEVATION TOP OF MUDLINE -5.0 FT±	
7. THICKNESS OF OVERBURDEN	>11 FT.	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0 FT.	19. INSPECTOR(S) D. MAZUJIAN	
9. TOTAL DEPTH OF HOLE	30 FT.		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
	4.0					
			(SP) BLACK COARSE TO FINE SAND, TRACE SILT, WET, LOOSE, STAINED BLACK, STRONG PHC ODOR		U-1	D&M U-1 SAMPLER 300#@30" 24" RECOVERY (6-2-2-2)
	8.0		(OH/SM) BLACK ORGANIC CLAY AND COARSE TO FINE SAND, WET, VERY SOFT, STAINED BLACK, STRONG PHC ODOR GRADING WITH FREQUENT WOOD FRAGMENTS		U-2	OSTERBERG SAMPLE, 3" O.D. TUBE, 7-9 FT, NO RECOVERY
					U-3	OSTERBERG SAMPLE, 3" O.D. TUBE, 9-11 FT, 12" RECOVERY
	12.0		NOTES: 1. BORING TERMINATED AT THE DEPTH OF 11.0 FEET BML ON 2-13-95. 2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 3.5 FT. AND 4.0 FT. DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-13-95.		
	16.0					
	20.0					
	24.0					
	28.0					

Hole No. NKG-5

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-5
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	76.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	76.5
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 29 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-17-93 / 11-17-93
17. ELEVATION TOP OF HOLE	6.5 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(SM) BLACK ORGANIC & TAN SILTY SAND W/ ROCK FRAG.	0.8	JAR #1		22
			(GM) GRAY & BROWN SILTY GRAVEL	0.9	JAR #2		15
	3.0		SAME	0.5	JAR #3		3
			(SW) BROWN SILTY SAND W/ TR. GRAVEL	0.5	JAR #4		2
	6.0		SAME	0.4	JAR #5		3
			(GM) BROWN SILTY GRAVEL	0.6	JAR #6		4
	9.0		(SM) BROWN SILTY SAND W/ TR. CONCRETE FRAG.	0.8	JAR #7		3
	11.0		END OF FILL (SM) BROWN SILTY SAND W/ TR. GRAVEL	0.9	JAR #8		5
	12.0		SAME	1.3	JAR #9		14
			(ML) BROWN CLAYEY SILT W/ TR. SAND LAYERS & MF GRAVEL	1.3	JAR #10	DRILLER SET 21' 4" CASING MX POLY-SAL AT 21.0'	9
	15.0		SAME	1.3	JAR #11	INT. G.W. ENC. AT d. 19.5 STATIC W.L. AT d. 17.2 AFTER 1 HRS.	9
			SAME	1.3	JAR #12		7
	18.0		(SM) BROWN SILTY SAND W/ F GRAVEL	1.4	JAR #13	▼	13
	21.0		SAME	1.0	JAR #14		12

TABLE B-1 (24A)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-5

00901-62

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-5
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	76.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	76.5
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM,MSL OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 29 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-17-93 / 11-17-93
17. ELEVATION TOP OF HOLE	6.5 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(SM) BROWN SILTY SAND W/ F GRAVEL	1.0	JAR #15		18
			SAME	0.9	JAR #16		22
	24.0		SAME	1.3	JAR #17		20
			SAME	1.4	JAR #18		15
	27.0		SAME	1.5	JAR #19		19
			SAME	1.4	JAR #20		19
	30.0						
	33.0						
	36.0		(ML) BROWN CLAYEY SILT	0.5	JAR #21		15
	39.0						
			SAME	1.4	JAR #22		41
	42.0						

TABLE B-1 (24B)

Hole No. NKG-5

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
2. LOCATION (Coordinates or Station) SEE SITE PLAN	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
3. DRILLING AGENCY MOBILE DISTRICT	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 29 — UNDISTURBED 0
4. HOLE NO. (As shown on drawing title and file number) NKG-5	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER J. BUSH	15. ELEVATION GROUNDWATER
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	16. DATE HOLE 11-17-93 — 11-17-93
	17. ELEVATION TOP OF HOLE 6.5 ±
7. THICKNESS OF OVERBURDEN 76.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. JONES
9. TOTAL DEPTH OF HOLE 76.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(SM) BROWN SILTY F SAND	1.4	JAR #23		58
	48.0						
	51.0		(ML) BROWN CLAYEY SILT	1.5	JAR #24		53
	54.0						
			SAME	1.5	JAR #25		34
	57.0						
	60.0		SAME	1.5	JAR #26		42
	63.0						

TABLE B-1 (24C)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-5

00901-64

Hole No. NKG-5

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
2. LOCATION (Coordinates or Station) SEE SITE PLAN	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
3. DRILLING AGENCY MOBILE DISTRICT	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 29; UNDISTURBED 0
4. HOLE NO. (As shown on drawing title and file number) NKG-5	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER J. BUSH	15. ELEVATION GROUNDWATER
6. DIRECTION OF HOLE [Y] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 11-17-93 11-17-93
	17. ELEVATION TOP OF HOLE 6.5 ±
7. THICKNESS OF OVERBURDEN 76.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. JONES
9. TOTAL DEPTH OF HOLE 76.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	66.0		SAME	1.5	JAR #27		43
	69.0						
			SAME	1.5	JAR #28		2'
	72.0						
	75.0		SAME	1.5	JAR #29		33
	76.5		BOTTOM OF BORING 76.5'				
	78.0						
	81.0						
	84.0						

TABLE B-1 (24D)

ENG FORM 1836 | PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-5

00901-65

Hole No. NKG-4

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-4
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	76.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	76.5
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 29 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-16-93 / 11-16-93
17. ELEVATION TOP OF HOLE	18.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(GM) BLACK SILTY GRAVEL (1/4" TO 3/4" CRUSHTONE & ASPHALT)	1.0	JAR #1		60
			SAME	1.0	JAR #2		13
	3.0		SAME	0.8	JAR #3		15
			SAME	1.0	JAR #4		18
	6.0		SAME	1.0	JAR #5		13
			(SM) BLACK SILTY SAND, TR. DECWOOD, GLASS, CONCRETE	1.1	JAR #6		9
	9.0		(ML) DK. BROWN & TAN CLAYEY SILT W/ SAND & CF GRAVEL	1.3	JAR #7		14
			END OF FILL (SM) BROWN SILTY SAND W/ TR. GRAVEL	1.3	JAR #8		12
	12.0		SAME	1.3	JAR #9		14
			(ML) TAN CLAYEY SANDY SILT	1.3	JAR #10	DRILLER SET 21' 4" CASING MX POLY-SAL AT 19.5'	13
	15.0		(SM) TAN SILTY SAND W/ TR. GRAVEL	1.0	JAR #11	INT. G.W. ENC. AT d. 19.5 STATIC W.L AT d. 15.6 AFTER 2 HRS.	10
			SAME	1.1	JAR #12		42
	18.0		SAME	1.2	JAR #13	▼	28
	21.0		(ML) BROWN & GRAY CLAYEY SILT W/ TR. GRAVEL	1.2	JAR #14		

TABLE B-1 (23A)

Hole No. NKG-4

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	
		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314	
3. DRILLING AGENCY MOBILE DISTRICT		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 29 / UNDISTURBED 0
4. HOLE NO. (As shown on drawing title and file number)	NKG-4	14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER J. BUSH		15. ELEVATION GROUNDWATER	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		16. DATE HOLE	11-16-93 / 11-16-93
		17. ELEVATION TOP OF HOLE 18.0 ±	
7. THICKNESS OF OVERBURDEN	76.5	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0	19. SIGNATURE OF INSPECTOR D. JONES	
9. TOTAL DEPTH OF HOLE	76.5		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
			(SW) BROWN SILTY SAND W/ F GRAVEL	1.1	JAR #15	42
			SAME	1.2	JAR #16	28
	24.0		SAME	1.2	JAR #17	17
			SAME	1.2	JAR #18	20
	27.0		(ML) BROWN SILT W/ F SAND	1.4	JAR #19	24
			SAME	1.4	JAR #20	19
	30.0					
	33.0					
	36.0		SAME	1.5	JAR #21	31
	39.0					
			SAME	1.4	JAR #22	55
	42.0					

TABLE B-1 (23B)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-4

00901-67

Hole No. NKG-4

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 29; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-16-93 11-16-93
	17. ELEVATION TOP OF HOLE 18.0 ±
7. THICKNESS OF OVERBURDEN 76.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. JONES
9. TOTAL DEPTH OF HOLE 76.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(ML) BROWN CLAYEY SILT W/ FINE SAND	1.5	JAR #23		31
	48.0						
	51.0		(SM) BROWN SILTY CF SAND	1.4	JAR #24		55
	54.0						
	57.0		(ML) BROWN CLAYEY SILT	1.4	JAR #25		50
	60.0		SAME	1.4	JAR #26		77
	63.0						

TABLE B-1 (23C)

Hole No. NKG-4

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 29; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-16-93 / 11-16-93
7. THICKNESS OF OVERBURDEN 76.5	17. ELEVATION TOP OF HOLE 18.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 76.5	19. SIGNATURE OF INSPECTOR D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		SAME	1.4	JAR #27	77
	69.0					
			SAME	0.3	JAR #28	27
	72.0					
	75.0		SAME	1.4	JAR #29	66
	76.5		BOTTOM OF BORING 76.5'			
	78.0					
	81.0					
	84.0					

TABLE B-1 (23D)

Hole No WT-2

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WT-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION N/A
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 2-9-95 2-10-95
	17. ELEVATION TOP OF MUDLINE -6.0 FT±
7. THICKNESS OF OVERBURDEN >31 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0 FT.	19. INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO
9. TOTAL DEPTH OF HOLE 30 FT.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			(OH) DARK GRAY ORGANIC CLAY, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, WET, VERY SOFT, OCCASIONAL ORGANICS, SHEEN ON SAMPLE, STAINED BLACK, STRONG PHC ODOR		S-1	OVM SCREEN OF SS = 4.5 ppm	WOR/2 FT
					S-2	OVM SCRREEN OF SS = 3.8 ppm	WOR/2 FT
	4.0		GRADING WITH OCCASIONAL SEAMS OF MEDIUM TO FINE SAND, OCCASIONAL BLACK STAINING, SOFT		S-3	OVM SCREEN OF SS = 5.2 ppm	3-2-2-4
			GRADING WITH SOME MEDIUM TO FINE GRAVEL (SILTSTONE) TO VERY STIFF		S-4		17-7-14-5
	8.0		GRADING WITH SOME COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL (SILTSTONE) TO STIFF		S-5	OVM SCREEN OF SS = 1.0 ppm	3-3-10-14
			(SP) YELLOWISH RED MEDIUM TO FINE SAND, TRACE FINE GRAVEL, TRACE SILT, WET, DENSE, WEAK PHC ODOR		S-6	OVM SCREEN OF SS = 0.0 ppm	13-17-31-30
	12.0		GRADING TO VERY DENSE AND COARSE TO FINE GRAVEL, TRACE CLAYEY SILT		S-7		14-25-32-43
			(ML) YELLOWISH RED CLAYEY SILT, TRACE FINE SAND, WET, HARD		S-8		13-14-18-16
	16.0		(SM) YELLOWISH RED MEDIUM FINE SAND AND COARSE TO FINE GRAVEL, LITTLE SILT, WET, MEDIUM DENSE		S-9	OVM SCREEN OF SS = 0.0 ppm	10-11-12-13
			(ML) YELLOWISH RED SILT AND FINE SAND, WET, VERY STIFF		S-10	OVM SCREEN OF SS = BDL	9-6-7-8
	20.0		(SP) YELLOWISH RED MEDIUM TO FINE SAND, WET, MEDIUM DENSE		S-11	OVM SCREEN OF SS = BDL	8-9-9-10
					S-12	OVM SCREEN OF SS = BDL	7-9-8-9
	24.0		GRADING TO FINE SAND, TRACE SILT		S-13		7-7-9-11
	28.0		(SM) YELLOWISH RED FINE SAND, LITTLE SILT, WET, MEDIUM DENSE		S-14		

ENG FORM 1836 | PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK | HOLE NO WT-2

00901-70

Hole No. WT-2

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D HSA
	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
2. LOCATION (Coordinates or Station) SEE SITE PLAN	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
3. DRILLING AGENCY WARREN GEORGE, INC.	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
4. HOLE NO. (As shown on drawing title and file number) WH-2	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER J. GORMAN	15. ELEVATION N/A
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 2-9-95 2-10-95
	17. ELEVATION TOP OF MUDLINE -6.0 FT±
7. THICKNESS OF OVERBURDEN >31 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0 FT.	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO
9. TOTAL DEPTH OF HOLE 30 FT.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN.
			SEE ABOVE		S-14	5-6-8-11
					S-15	7-7-7-11
	32.0		NOTES: 1. BORING TERMINATED AT THE DEPTH OF 31.0 FEET BML ON 2-10-95. 2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 4.5 FT AND 5.5 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-10-95.			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No. NKG-3

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 28; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-15-93 11-15-93
7. THICKNESS OF OVERBURDEN 71.5	17. ELEVATION TOP OF HOLE 20.0 ±
8. DEPTH DRILLED INTO ROCK 0.0	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 71.5	19. SIGNATURE OF INSPECTOR D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(ML) DK. GRAY CLAYEY SILT TRACE ROCK FRAG.	0.9	JAR #1		30
	3.0		(GM) BLACK SILTY GRAVEL (1/4" TO 1/2" ASHALT FRAG.)	0.8	JAR #2		20
			(GM) DK. BROWN SILTY GRAVEL (1/4" TO 1/2" CRUSHTONE)	0.8	JAR #3		17
	6.0		SAME	0.7	JAR #4		18
			DARK BROWN AND TAN GRAVEL (1/4" TO 1/2" CRUSHSTONE)	0.7	JAR #5		12
	9.0		(ML) BROWN CLAYEY SANDY SILT W/ SOME ROCK FRAG.	1.0	JAR #6		29
			(GM) DARK BROWN CLAYEY SANDY SILT W/ TR ASPHALT FRAG.	1.2	JAR #7		43
	12.0		(GM) DARK BROWN SILTY GRAVEL	1.0	JAR #8		34
			SAME	1.1	JAR #9		24
	15.0		SAME	1.1	JAR #10	DRILLER SET 23' 4" CASING MX POLY-SAL AT 22.5'	22
			SAME	1.3	JAR #11	INT. G.W. ENC. AT d. 21.0 STATIC W.L. AT d. 17.0 AFTER 2 HRS.	28
	18.0		(SM) DK. BROWN SILTY SAND W/ TR GRAVEL, CINDERS, ASPHALT IRON PIECES, AND DECOMP. WOOD	1.2	JAR #12		27
			END OF FILL (SW-SM) BROWN SILTY SAND W/ FINE GRAVEL	1.2	JAR #13		23
	21.0		SAME	1.2	JAR #14		17

TABLE B-1 (22A)

Hole No. NKG-3

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-3
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	71.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	71.5
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 28 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-15-93 / 11-15-93
17. ELEVATION TOP OF HOLE	20.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(SW) BROWN SILTY SAND W/ CF GRAVEL	1.3	JAR #15		13
			SAME	1.2	JAR #16		24
	24.0		SAME	1.2	JAR #17		25
			(SM) BROWN SILTY SAND, TRACE CF GRAVEL	1.4	JAR #18		18
	27.0		SAME	1.4	JAR #19		23
			SAME	1.4	JAR #20		23
	30.0						
	33.0						
	36.0		(ML) BROWN CLAYEY SILT	1.3	JAR #21		26
	39.0						
			SAME	1.4	JAR #22		40
	42.0						

TABLE B-1 (22B)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-3

00901-73

Hole No. NKG-3

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 28; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-15-93 | 11-15-93
	17. ELEVATION TOP OF HOLE 20.0 ±
7. THICKNESS OF OVERBURDEN 71.5	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. JONES
9. TOTAL DEPTH OF HOLE 71.5	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(ML) BROWN CLAYEY SILT	1.5	JAR #23		22
	48.0						
	51.0		(SM) BROWN SILTY SAND W/ FINE GRAVEL	1.3	JAR #24		72
	54.0						
			SAME	1.3	JAR #25		47
	57.0						
	60.0		(ML) BROWN CLAYEY SILT W/ TRACE (SM) SILTY SAND LAYERS	1.4	JAR #26		60
	63.0						

TABLE B-1 (22C)

Hole No. NKG-3

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-3
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	71.5
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	71.5
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 28 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-15-93 / 11-15-93
17. ELEVATION TOP OF HOLE	20.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	66.0		SAME	1.4	JAR #27	67
	69.0					
	71.5		(ML) BROWN CLAYEY SILT W/ TR GRAVEL(1/2" TO 1/4")	1.4	JAR #28	28
	72.0		BOTTOM OF BORING 71.5'			
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (22D)

ENG FORM 1836

PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK

HOLE NO. NKG-3

00901-75

Hole No. WTH-2

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT	PASSAIC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	WARREN GEORGE, INC
4. HOLE NO. (As shown on drawing title and file number)	WTH-2
5. NAME OF DRILLER	J. GORMAN
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	>30 FT.
8. DEPTH DRILLED INTO ROCK	0.0 FT.
9. TOTAL DEPTH OF HOLE	30 FT.
10. SIZE AND TYPE OF BIT	5" NOM O.D. HSA
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	MOBILE B-61 (SKID RIG ON BARGE)
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 14 / UNDISTURBED 1
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION N/A	
16. DATE HOLE	2-14-95 / 2-15-95
17. ELEVATION TOP OF MUDLINE	-4.0 FT±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. INSPECTOR(S)	D. MAZUJIAN/M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			(SP-SM) DARK BROWN-BLACK COARSE TO FINE SAND, TRACE FINE GRAVEL, TRACE SILT, WET, VERY LOOSE, OCCASIONAL BLACK STAINING, FREQUENT WOODEN DEBRIS, PHC ODOR		S-1	OVM SCREEN OF SS = BDL 3" SS SAMPLER (WOR/2 FT)
			(OH) DARK GRAY ORGANIC CLAY, SOME COARSE TO FINE SAND, TRACE FINE GRAVEL, FREQUENT WOOD FRAGMENTS, WET, VERY SOFT, PHC ODOR, OCCASIONALLY STAINED BLACK		S-2	OVM SCREEN OF SS = 4.6,4.9,4.8 ppm 3" SS SAMPLER (WOR/2 FT)
	4.0				S-3	OVM SCREEN OF SS = 11.0, 4.6 ppm 3" SS SAMPLER, 300#@24" (1-2-2-4)
			(SP-SM) OLIVE GRAY-YELLOWISH RED COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL, TRACE SILT WET, VERY LOOSE		S-4	OVM SCREEN OF SS = BDL 3-2-1-7
	8.0		GRADING WITH OCCASIONAL LAYERS APPROXIMATELY 2 TO 4 INCHES THICK, OF OLIVE GRAY ORGANIC CLAY, LITTLE MEDIUM TO FINE SAND		S-5	OVM SCREEN OF SS = BDL 2-1-2-2
			GRADING TO YELLOWISH RED FINE SAND, TRACE SILT.		S-6	OVM SCREEN OF SS = BDL 2-3-3-12.
	12.0		(GP) YELLOWISH RED COARSE TO FINE GRAVEL AND COARSE TO FINE SAND, TRACE SILT, WET, DENSE		S-7	OVM SCREEN OF SS = BDL 5-14-18-21
					S-8	OVM SCREEN OF SS = BDL 15-19-26-26
	16.0		GRADING WITH OCCASIONAL LAYERS, APPROXIMATELY 4 INCH THICK, OF COARSE TO FINE SAND, TRACE FINE GRAVEL		S-9	OVM SCREEN OF SS = BDL 4-8-9-9
					S-10	OVM SCREEN OF SS = BDL 7-10-12-16
	20.0		(SM/ML) YELLOWISH RED LAMINATED FINE SAND AND CLAYEY SILT, WET, MEDIUM DENSE/VERY STIFF		U-1	OVM SCREEN OF SS = BDL (SEE NOTE 4) (5-7-9-9)
					S-11	OVM SCREEN OF SS = BDL 7-11-14-17
	24.0		GRADING WITH TRACE COARSE TO MEDIUM SAND TO DENSE/HARD		S-12	OVM SCREEN OF SS = BDL 12-16-17-18
					S-13	OVM SCREEN OF SS = BDL 15-19-22-23
	28.0					

00901-76

Hole No WTH-2

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM O.D HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WTH-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 14; UNDISTURBED 1
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION N/A
7. THICKNESS OF OVERBURDEN >30 FT.	16. DATE HOLE 2-14-95 / 2-15-95
8. DEPTH DRILLED INTO ROCK 0.0 FT.	17. ELEVATION TOP OF MUDLINE -4.0 FT±
9. TOTAL DEPTH OF HOLE 30 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			GRADING TO VERY DENSE/HARD		S-14	18-23-28-30
	32.0					
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

NOTES
1. BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-15-95.
2. SURFACE WATER THICKNESS VARIED WITH TIDE FROM 2.3 FT TO 9 FT DURING DRILLING.
3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-15-95.
4. U-1: D&M U-1 SAMPLER 300#@24" 22" RECOVERY
5. ENVIRONMENTAL SAMPLES COLLECTED AS FOLLOWS
   a) WTH-2A, 0'-6', COMPOSITE
   b) WTH-2A, 4'-5', DISCRETE
   c) WTH-2A-MS, 0-6', COMPOSITE
   c) WTH-2A-MS, 0'-6', COMPOSITE "MATRIX SPIKE"
   d) WTH-2A-MS, 4'-5', DISCRETE "MATRIX SPIKE"
   e) WTH-2A-MSD, 0'-6', COMPOSITE "MATRIX SPIKE" "DUPLICATE"
   f) WTH-2A-MSD, 4'-5', DISCRETE "MATRIX SPIKE" "DUPLICATE"
   g) WTH-2B, 6'-12', COMPOSITE
   h) WTH-2B, 6'-7', DISCRETE
   i) WTH-2BD, 6'-12', COMPOSITE "DUPLICATE"
   j) WTH-2BD, 6'-7', DISCRETE "DUPLICATE"

Hole No. NKG-2

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 26; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-11-93 | 11-12-93
	17. ELEVATION TOP OF HOLE 17.7 ±
7. THICKNESS OF OVERBURDEN 60.9	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. JONES
9. TOTAL DEPTH OF HOLE 65.0	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT.
			(ML) DK. GRAY CLAYEY SILT TRACE ROCK FRAG.	1.0	JAR #1		17
			(SM) BROWN SILTY SAND, LITTLE CRUSHSTONE & ASPHALT FRAG.	0.9	JAR #2		13
	3.0		(GM) BROWN AND BLACK SILTY GRAVEL (1/4" TO 1/2")	1.0	JAR #3		29
			SAME	1.3	JAR #4		21
	6.0		DARK BROWN AND TAN CRUSTONE (1/4" TO 1/2")	1.0	JAR #5		10
			(SM) BROWN SILTY SAND, LITLE CRUSTONE & ASPHALT FRAG.	0.6	JAR #6		9
	9.0		(GM) BROWN AND TAN SILTY GRAVEL(ASPH, CS, CONC. FRAG.)	1.0	JAR #7		28
			(SM) BROWN AND TAN SILTY SAND W/ SOME GRAVEL (1/4" TO 1/2") END OF FILL	1.0	JAR #8		36
	12.0		(ML) REDDISH CLAYEY SANDY SILT W/ TR GRAV (1/4" TO 3/4")	1.3	JAR #9		23
			(SM) REDDISH SILTY SAND W/ TR (ML) LAYERS & LENSES, F GRAVEL	0.8	JAR #10	DRILLER SET 15' 6" CASING MX POLY-SAL AT 19.5'	18
	15.0		SAME	1.3	JAR #11	INT. G.W. ENC. AT @ 19.5 STATIC W.L AT @ 15.5 AFTER 3 HRS.	28
			SAME	1.2	JAR #12		22
	18.0		SAME	1.2	JAR #13	▼	23
			(SW-SM) BROWN SILTY SAND W/ COARSE GRAVEL	0.8	JAR #14		8
	21.0						

TABLE B-1 (21A)

ENG FORM 1836 | PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-2

00901-78

Hole No. NKG-2

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RS
		11. DATUM FOR ELEVATION SHOWN (TBM/MSL OR NGVD)	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314	
3. DRILLING AGENCY MOBILE DISTRICT		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 26 / UNDISTURBED 0
4. HOLE NO. (As shown on drawing title and file number)	NKG-2	14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER J. BUSH		15. ELEVATION GROUNDWATER	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.		16. DATE HOLE	11-11-93 / 11-12-93
		17. ELEVATION TOP OF HOLE	17.7 ±
7. THICKNESS OF OVERBURDEN	60.9	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0	19. SIGNATURE OF INSPECTOR D. JONES	
9. TOTAL DEPTH OF HOLE	65.0		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	1.2	JAR #15		14
			SAME	1.3	JAR #16		27
	24.0		(SM) BROWN SILTY SAND W/ F GRAVEL	1.2	JAR #17		25
			SAME	1.2	JAR #18		29
	27.0		(SM) BROWN SILTY F SAND	1.4	JAR #19		19
			SAME	1.4	JAR #20		50
	30.0						
	33.0						
	36.0		(SM) BROWN SILTY F SAND	1.4	JAR #21		50
	39.0						
			SAME	1.3	JAR #22		23
	42.0						

TABLE B-1 (21B)

Hole No. NKG-2

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 26; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-11-93 / 11-12-93
	17. ELEVATION TOP OF HOLE 17.7 ±
7. THICKNESS OF OVERBURDEN 60.9	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR D. JONES
9. TOTAL DEPTH OF HOLE 65.0	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
	45.0		(ML) BROWN SILT	1.4	JAR #23		87
	48.0		SAME	0.8	JAR #24		50
	54.0		SAME	0.8	JAR #25		50
	60.0		(SM) BROWN SILTY F SAND	0.9	JAR #26		50
	63.0						

TABLE B-1 (21C)

Hole No. NKG-2

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-2
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	60.9
8. DEPTH DRILLED INTO ROCK	0.0
9. TOTAL DEPTH OF HOLE	65.0
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 26 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-11-93 / 11-12-93
17. ELEVATION TOP OF HOLE	17.7 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
			NO RECOVERY (REFUSAL)	0.0		50
			BOTTOM OF BORING 65.0'			
	66.0					
	69.0					
	72.0					
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (21D)

ENG FORM 1836 | PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-2

00901-81

Hole No. B-1-94

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 1 OF 2 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB	
2. LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY MOBILE DISTRICT		12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314	
4. HOLE NO. (As shown on drawing title and file number)	B-1-94	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 8 / UNDISTURBED 0
5. NAME OF DRILLER MOON		14. TOTAL NUMBER CORE BOXES	
		15. ELEVATION GROUNDWATER	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		16. DATE HOLE	6-20-94 / 6-20-94
		17. ELEVATION TOP OF HOLE 17.4 ±	
7. THICKNESS OF OVERBURDEN	18.0	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0	19. SIGNATURE OF INSPECTOR M. ROGALSKI	
9. TOTAL DEPTH OF HOLE	18.0		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
			(ML) BROWN SANDY SILT W/ ROCK FRAG.		JAR #1	PID READING 0.0 PPM 4-15-17-11
	3.0		(ML) REDDISH BROWN SANDY SILT W/ ROCK FRAG.		JAR #2	PID READING 0.0 PPM 12-13-25-20
			(SM) REDDISH BROWN SILTY SAND W/ F GRAVEL & ROCK FRAG.		JAR #3	PID READING 0.0 PPM 33-10-20-25
	6.0		SAME		JAR #4	PID READING 0.0 PPM 8-8-9-9
	9.0		SAME		JAR #5	PID READING 0.0 PPM 4-4-11-12
			SAME		JAR #6	PID READING 0.0 PPM 8-7-7-7
	12.0		SAME		JAR #7	PID READING 0.0 PPM 7-5-6-6
	15.0		SAME		JAR #8	▼ WATER ENCOUNTERED @ d. 15.0 PID READING 0.0 PPM 8-4-4-4
			NO SAMPLE TAKEN			2" PVC MONITORING WELL SET @ d. 17.0
	18.0		BOTTOM OF BORING 18.0			HOLE GOUTED W/ 1 BAG GROUT

TABLE B-1 (1A)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. B-1-94

00901-82

Hole No. B-1-94

DRILLING LOG	DIVISION CENAD	INSTALLATION CENAN-PR	SHEET 2 OF 2 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 1/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) B-1-94	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 8; UNDISTURBED 0
5. NAME OF DRILLER MOON	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 6-20-94 6-20-94
	17. ELEVATION TOP OF HOLE 17.4 ±
7. THICKNESS OF OVERBURDEN 18.0	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0	19. SIGNATURE OF INSPECTOR M. ROGALSKI
9. TOTAL DEPTH OF HOLE 18.0	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT

MON. READINGS

d.	PID Below Ground	PID Breathing Zone	CGI O_2 Breathing Zone	CGI LEL Breathing Zone
0.0		0 ppm	20.9	0
2.0	0 ppm	0 ppm		
4.0	0 ppm	0 ppm	20.9	0
6.0	0 ppm	0 ppm	20.9	0
8.0	0 ppm	0 ppm	20.9	0
10.0	0 ppm	0 ppm		
12.0	0 ppm	0 ppm		
14.0	0 ppm	0 ppm	20.9	0
16.0	0 ppm	0 ppm		

HTRW SOIL SAMPLES MAILED TO NED LAB.

0.0-8.0'

#1 - 2-40 ML - VOA
#2 - 1-8 OZ - SEMI-VOL
#3 - 1-8 OZ - TAL METALS
#4 - 1-8 OZ - TRPH
#5 - 1-8 OZ - TOC
#6 - 1-8 OZ - DIOXINS

1 COMPLETE SET OF QC SAMPLES WAS MAILED.

8.0-16.0'

#7 - 2-40 ML - VOA
#8 - 1-8 OZ - SEMI-VOL
#9 - 1-8 OZ - TAL METALS
#10 - 1-8 OZ - TRPH
#11 - 1-8 OZ - TOC
#12 - 1-8 OZ - DIOXINS
#13 - 1-40 ML - TRIP BLANK

TABLE B-1 (1B)

Hole No. NKG-1

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 1 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-1
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	65.1
8. DEPTH DRILLED INTO ROCK	4.5
9. TOTAL DEPTH OF HOLE	69.6
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 27 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	27
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-10-93 / 11-13-93
17. ELEVATION TOP OF HOLE	16.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			(ML) DK. GRAY CLAYEY SILT	0.8	JAR #1		39
	3.0		(GM) DK. GRAY SILTY GRAVEL	1.2	JAR #2		35
			SAME	1.0	JAR #3		17
	6.0		SAME	1.3	JAR #4		21
			SAME	1.3	JAR #5		60
			SAME	1.3	JAR #6		60
	9.0		SAME W/ CONCRETE PIECES	0.6	JAR #7		42
			(GM) DK. GRAY SILTY GRAVEL	1.2	JAR #8		34
	12.0		END OF FILL				
	12.5		(SM) DK. GRAY SILTY SAND W/ SAME CF GRAVEL	1.0	JAR #9		21
			(SM) REDDISH SILTY SAND W/ TR (ML) LAYERS & LENSES, F GRAVEL	0.4	JAR #10	DRILLER SET 15' 6" CASING MX POLY-SAL AT 19.5'	16
	15.0		SAME	0.9	JAR #11	INT. G.W. ENC. AT d. 19.5 STATIC W.L. AL d. 13.5 AFTER 17 HRS.	13
			SAME	0.7	JAR #12		17
	18.0		SAME	1.0	JAR #13		9
			SAME	0.8	JAR #14		15
	21.0						

TABLE B-1 (20A)

ENG FORM 1836 | PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-1

00901-84

Hole No. NKG-1

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 2 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-1
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	65.1
8. DEPTH DRILLED INTO ROCK	4.5
9. TOTAL DEPTH OF HOLE	69.5
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 27 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-10-93 / 11-13-93
17. ELEVATION TOP OF HOLE	16.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/FT
			SAME	0.8	JAR #15		39
			SAME	1.2	JAR #16		35
	24.0		(SM) BROWN SILTY SAND W/ F GRAVEL	1.0	JAR #17		17
			SAME	1.3	JAR #18		21
	27.0		(SM) BROWN SILTY SAND W/ TR (ML) LAYERS & LENSES (F GR)	1.3	JAR #19		60
			SAME		JAR #20		
	30.0						
	33.0						
	36.0		(SM) BROWN SILTY SAND W/ F GRAVEL	1.2	JAR #21		24
	39.0						
			SAME	1.3	JAR #22		23
	42.0						

TABLE B-1 (20B)

ENG FORM 1836 | PROJECT: PASSIAC RIVER BANK RESTORATION, NEWARK | HOLE NO. NKG-1

60901-85

Hole No. NKG-1

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 3 OF 4 SHEETS

1. PROJECT PASSIAC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" AUGER & 3 7/8" RB
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY MOBILE DISTRICT	12. MANUFACTORER'S DESIGNATION OF DRILL FAILING 314
4. HOLE NO. (As shown on drawing title and file number) NKG-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 27; UNDISTURBED 0
5. NAME OF DRILLER J. BUSH	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 11-10-93 11-13-93
7. THICKNESS OF OVERBURDEN 65.1	17. ELEVATION TOP OF HOLE 16.0 ±
8. DEPTH DRILLED INTO ROCK 4.5	18. TOTAL CORE RECOVERY FOR BORING N/A
9. TOTAL DEPTH OF HOLE 69.6	19. SIGNATURE OF INSPECTOR D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	45.0		(SM) BROWN SILTY SAND W/ F GRAVEL	1.2	JAR #23	30
	48.0					
	51.0		(ML) BROWN SILT	1.3	JAR #24	35
	54.0					
			(GC) REDDISH CLAYEY GRAVEL F GRAVEL	1.2	JAR #25	100
	57.0					
	60.0		SAME	1.3	JAR #26	23
	63.0					

TABLE B-1 (20C)

Hole No. NKG-1

DRILLING LOG	DIVISION ORD	INSTALLATION NED	SHEET 4 OF 4 SHEETS

1. PROJECT	PASSIAC RIVER BANK RESTORATION, NEWARK
2. LOCATION (Coordinates or Station)	SEE SITE PLAN
3. DRILLING AGENCY	MOBILE DISTRICT
4. HOLE NO. (As shown on drawing title and file number)	NKG-1
5. NAME OF DRILLER	J. BUSH
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	65.1
8. DEPTH DRILLED INTO ROCK	4.5
9. TOTAL DEPTH OF HOLE	69.6
10. SIZE AND TYPE OF BIT	5" AUGER & 3 7/8" RB
11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12. MANUFACTORER'S DESIGNATION OF DRILL	FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 27 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUNDWATER	
16. DATE HOLE	11-10-93 / 11-13-93
17. ELEVATION TOP OF HOLE	16.0 ±
18. TOTAL CORE RECOVERY FOR BORING	N/A
19. SIGNATURE OF INSPECTOR	D. JONES

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
				1.2		30
			SAME		UAR#27	
	66.0		SHALE, MEDIUM HARD, HIGHLY FRACTURED, REDDISH BROWN			RUN #1 RAN - 4.5' REC. - 3.8 DRILL TIME - 25 MIN DRILL ACTION - SMOOTH WATER RETURN 95% 5% LOST IN OVERBURDEN
	69.0					
			BOTTOM OF BORING 69.6'			
	72.0					
	75.0					
	78.0					
	81.0					
	84.0					

TABLE B-1 (20D)

Hole No. WT-1

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT: PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT: 6" NOM. O.D. HSA	
2. LOCATION (Coordinates or Station): SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY: WARREN GEORGE, INC.		12. MANUFACTORER'S DESIGNATION OF DRILL: MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO. (As shown on drawing title and file number): WT-1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: 14 / UNDISTURBED: 1
5. NAME OF DRILLER: J. GORMAN		14. TOTAL NUMBER CORE BOXES	
		15. ELEVATION: N/A	
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		16. DATE HOLE	2-10-95 / 2-13-95
		17. ELEVATION TOP OF MUDLINE: -8.0 FT.±	
7. THICKNESS OF OVERBURDEN: >30 FT.		18. TOTAL CORE RECOVERY FOR BORING: N/A	
8. DEPTH DRILLED INTO ROCK: 0.0 FT.		19. INSPECTORS: D. MAZUJIAN	
9. TOTAL DEPTH OF HOLE: 30 FT.			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN.
			(OH) DARK GRAY-BLACK ORGANIC CLAY, TRACE COARSE TO FINE SAND, WET, VERY SOFT STAINED BLACK, STRONG PHC ODOR		S-1	OVM SCREEN OF SS = 0 TO 0.9	WOR/2 FT
					S-2	OVM SCREEN OF SS = 1 TO 4.8	WOR/2 FT
	4.0		GRADING WITH LITTLE COARSE TO FINE GRAVEL, LITTLE COARSE TO FINE SAND		S-3	OVM SCREEN OF SS = 1.6 TO 2.9	WOR/2 FT
			GRADING WITHOUT GRAVEL		S-4	OVM SCREEN OF SS = 2.0 TO 7.1	WOR/2 FT
	8.0		GRADING TO DARK GRAY WITH FREQUENT BLACK STAINING		S-5	OVM SCREEN OF SS = 1.6 TO 2.2	WOR/2 FT
			GRADING WITHOUT SAND		S-6	OVM SCREEN OF SS = 1.6 TO 2.8	WOR/2 FT
	12.0		(OH/SM) DARK GRAY ORGANIC SILT-CLAY AND FINE SAND, WET, MEDIUM STIFF, FREQUENTLY STAINED BLACK, STRONG PHC ODOR		S-7	OVM SCREEN OF SS = 0.6 TO 3.0	6-4-4-5
			(SM/ML) YELLOWISH RED INTERBEDDED FINE SAND AND SILT, OCCASIONAL POCKETS OF CLAYEY SILT, WET, MEDIUM DENSE/VERY STIFF		S-8	OVM SCREEN OF SS = BDL TO 0.6	12-13-14-16
	16.0		GRADING TO LOOSE/MEDIUM STIFF		S-9	OVM SCREEN OF SS = BDL	3-3-4-4
			GRADING TO MEDIUM DENSE/STIFF		S-10	OVM SCREEN OF SS = BDL	6-7-7-8
	20.0				U-1	OVM SCREEN OF SS = BDL (SEE NOTE 4)	(4-5-6-4)
			GRADING TO MEDIUM DENSE/HARD		S-11	OVM SCREEN OF SS = BDL	7-7-14-16
	24.0		(SP) YELLOWISH RED COARSE TO FINE SAND AND COARSE TO FINE GRAVEL, TRACE SILT, WET, MEDIUM DENSE		S-12		8-14-31-30
			(ML) YELLOWISH RED CLAYEY SILT AND FINE SAND, WET, HARD				
			GRADING WITH LITTLE MEDIUM TO FINE GRAVEL		S-13		18-25-30-36
	28.0						

Hole No. WT-1

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 8" NOM. O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WT-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 14; UNDISTURBED 1
5. NAME OF DRILLER J. GORMAN	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUNDWATER
	16. DATE HOLE 2-10-95 2-13-95
	17. ELEVATION TOP OF MUDLINE -8.0 FT.±
7. THICKNESS OF OVERBURDEN >30 FT	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0 FT.	19. SIGNATURE OF INSPECTOR D. MAZUJIAN
9. TOTAL DEPTH OF HOLE 30 FT.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/6 IN
			SEE ABOVE		S-14	20-33-35-35
	32.0		NOTES: 1. BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-13-95. 2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 7.5 FT AND 10.5 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-13-95 4. U-1: D&M U-1 SAMPLER 300# @ 24" 24" RECOVERY			
	36.0					
	40.0					
	44.0					
	48.0					
	52.0					
	56.0					

Hole No WT-1A

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEET

1 PROJECT	PASSAIC RIVER BANK RESTORATION, NEWARK
2 LOCATION (Coordinates or Station)	SEE SITE PLAN
3 DRILLING AGENCY	WARREN GEORGE, INC.
4 HOLE NO (As shown on drawing title and file number)	WT-1A
5 NAME OF DRILLER	J GORMAN
6 DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG FROM VERT.
7 THICKNESS OF OVERBURDEN	>12 FT.
8 DEPTH DRILLED INTO ROCK	0.0 FT.
9 TOTAL DEPTH OF HOLE	12 FT.
10 SIZE AND TYPE OF BIT	5" AUGER & 3 1/2" RB
11 DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
12 MANUFACTORER'S DESIGNATION OF DRILL	MOBILE B-61 (SKID RIG ON BARGE)
13 TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 0 / UNDISTURBED 2
14 TOTAL NUMBER CORE BOXES	
15 ELEVATION GROUNDWATER	
16 DATE HOLE	2-13-95 / 2-13-95
17 ELEVATION TOP OF MUDLINE	
18 TOTAL CORE RECOVERY FOR BORING	N/A
19 INSPECTORS	D. MAZUJIAN

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
	4.0		DARK GRAY ORGANIC CLAY, SOME FINE GRAVEL, FREQUENT POCKETS OF COARSE TO FINE SAND, WET, VERY SOFT/LOOSE FREQUENTLY STAINED BLACK, PHC ODOR			
	8.0		GRADING WITH LITTLE FINE GRAVEL		U-1	(SEE NOTE 4) pp=0.169 TSF TOR=0.128 TSP (5-3-2-1)
			GRADING WITHOUT COARSE SAND, FINE GRAVEL		U-2	OSTERBERG SAMPLE, 3" O.D. TUBE, 10-12 FT, 16" RECOVERY
	12.0		NOTES 1 BORING TERMINATED AT THE DEPTH OF 12.0 FEET BML ON 2-13-95. 2 SURFACE WATER THICKNESS APPROXIMATELY 8 FT DURING DRILLING. 3. BOREHOLE TREMIE GROUTED WITH CEMENT/BENTONITE GROUT ON 2-13-95. 4 U-1 D&M U-1 SAMPLER 300# @ 24" 8" RECOVERY			
	16.0					
	20.0					
	24.0					
	28.0					

Hole No. WTH-1

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK		10. SIZE AND TYPE OF BIT	8" NOM. O.D. HSA
LOCATION (Coordinates or Station) SEE SITE PLAN		11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)	
3. DRILLING AGENCY WARREN GEORGE, INC		12. MANUFACTORER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)	
4. HOLE NO. (As shown on drawing title and file number)	WTH-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 14 / UNDISTURBED 1
5. NAME OF DRILLER J. GORMAN		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		15. ELEVATION N/A	
		16. DATE HOLE	2-14-95 / 2-14-95
		17. ELEVATION TOP OF MUDLINE	-6.8 FT±
7. THICKNESS OF OVERBURDEN	>30 FT.	18. TOTAL CORE RECOVERY FOR BORING	N/A
8. DEPTH DRILLED INTO ROCK	0.0 FT.	19. INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO	
9. TOTAL DEPTH OF HOLE	30 FT.		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			(GP-GM) DARK GRAY-BLACK COARSE TO FINE GRAVEL, LITTLE COARSE TO FINE SAND, TRACE CLAYEY SILT, WET, VERY LOOSE, STAINED BLACK, STRONG PHC ODOR		S-1	OVM SCREEN OF SS = BDL 3"SS	(WOR/2 FT)
					S-2	OVM SCREEN OF SS = 4.1, 2.0 ppm 3"SS, 300#@24"	(3-2-2-1)
	4.0				S-3	OVM SCREEN OF SS = BDL 3"SS, 300#@24"	(2-1-1-1)
			GRADING WITH SOME COARSE TO FINE SAND, OCCASIONAL DARK GRAY ORGANIC CLAY LAYERS, APPROX. 4-IN THICK TRACE ORGANICS		S-4	OVM SCREEN OF SS = 3.4,6.9 ppm	WOR/2 FT
	8.0		GRADING TO AND COARSE TO FINE SAND		S-5	OVM SCREEN OF SS = 4.6,8.3,5.5 ppm	WOR/2 FT
			(SP/SM) DARK GRAY-BLACK COARSE TO FINE SAND AND COARSE TO FINE GRAVEL TRACE SILT, WET, LOOSE, STAINED BLACK, MODERATE PHC ODOR		S-6	OVM SCREEN OF SS = 2.7,4.1 ppm	3-3-5-9
	12.0		(ML/CL) YELLOWISH RED LAMINATED CLAYEY SILT AND FINE SAND, WET, VERY STIFF, WEAK PHC ODOR		S-7	OVM SCREEN OF SS = BDL	5-9-12-11
			(SM) YELLOWISH RED FINE SAND, SOME SILT, OCCASIONAL SEAMS AND LAYERS (1/4 TO 1-INCH) CLAYEY SILT, WET, MEDIUM DENSE		S-8	OVM SCREEN OF SS = BDL	6-8-9-12
	16.0		(ML/CL) YELLOWISH RED LAMINATED CLAYEY SILT AND FINE SAND, WET, VERY STIFF		S-9 (U-1)	OVM SCREEN OF SS = BDL (SEE NOTE)	(3-5-6-5)
					S-10	OVM SCREEN OF SS = BDL	8-10-16-18
	20.0		(SM) YELLOWISH RED FINE SAND, LITTLE SILT, WET, DENSE		S-11	OVM SCREEN OF SS = BDL	14-18-25-31
			(SP) YELLOWISH RED COARSE TO FINE SAND TRACE SILT, OCCASIONAL COARSE TO MEDIUM GRAVEL, WET, DENSE		S-12	OVM SCREEN OF SS = BDL	9-14-12-13
	24.0		(CL-ML) YELLOWISH RED LAMINATED CLAYEY SILT AND FINE SAND, WET, STIFF		S-13	OVM SCREEN OF SS = BDL	6-6-7-9
			(SM) YELLOWISH RED FINE SAND AND SILT, TRACE COARSE TO MEDIUM SAND, WET, MEDIUM DENSE				
			(SP) YELLOWISH RED COARSE TO FINE SAND, LITTLE FINE GRAVEL, TRACE SILT, WET, DENSE		S-14	OVM SCREEN OF SS = BDL	10-18-20-24
	28.0						

00901-91

Hole No. WTH-1

DRILLING LOG	DIVISION NEW YORK DISTRICT PASSAIC RIVER DIV.	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT PASSAIC RIVER BANK RESTORATION, NEWARK	10. SIZE AND TYPE OF BIT 5" NOM O.D. HSA
2. LOCATION (Coordinates or Station) SEE SITE PLAN	11. DATUM FOR ELEVATION SHOWN (TBM,MSL, OR NGVD)
3. DRILLING AGENCY WARREN GEORGE, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL MOBILE B-61 (SKID RIG ON BARGE)
4. HOLE NO. (As shown on drawing title and file number) WTH-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 14; UNDISTURBED 1
	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER J. GORMAN	15. ELEVATION N/A
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.	16. DATE HOLE 2-14-95 | 2-14-95
	17. ELEVATION TOP OF MUDLINE -6.8 FT±
7. THICKNESS OF OVERBURDEN >30 FT.	18. TOTAL CORE RECOVERY FOR BORING N/A
8. DEPTH DRILLED INTO ROCK 0.0 FT.	19. SIGNATURE OF INSPECTOR(S) D. MAZUJIAN/M. TORSIELLO
9. TOTAL DEPTH OF HOLE 30 FT.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	SPT BLOWS/6 IN
			GRADING WITH OCCASIONAL SEAMS OF SILT		S-15	OVM SCREEN OF SS = BDL	13-17-22-25
	32.0						
	36.0						
	40.0						
	44.0						
	48.0						
	52.0						
	56.0						

NOTES:
1. BORING TERMINATED AT THE DEPTH OF 30.0 FEET BML ON 2-14-95.
2. SURFACE WATER THICKNESS VARIED WITH TIDE BETWEEN 13.6 FT AND 15.6 FT DURING DRILLING.
3. BOREHOLE TREMIE GROUTED WITH CEMENT BENTONITE GROUT ON 2-14-95.
4. S-9 (U-1) D&M SAMPLER 300# @ 30" 24" RECOVERY
5. ENVIRONMENTAL SAMPLES COLLECTED AS FOLLOWS:
   a) WTH-1-A, 0-6', COMPOSITE
   b) WTH-1-A, 2.5'-3.5', DISCRETE
   c) WTH-1-B, 6-12', COMPOSITE
   d) WTH-1-B, 9-10', DISCRETE

SECTION 00903

APPENDIX C - SURVEY BASELINE TIES

JOSEPH G. MINISH
PASSAIC RIVER WATERFRONT
PARK AND HISTORIC AREA

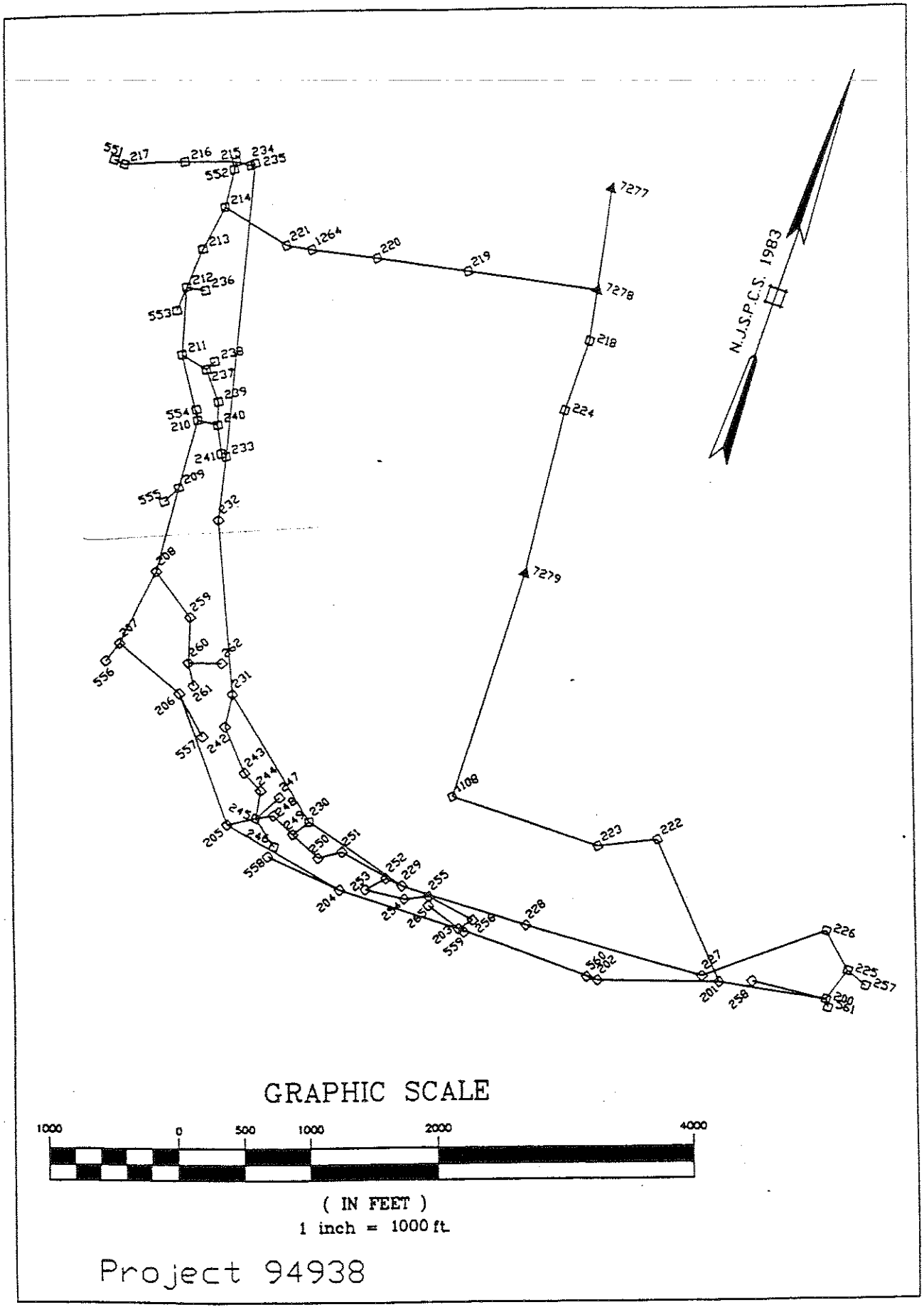
CONTROL REPORT

Prepared by GEOD Corporation

SECTION 1

Plot of Horizontal Control and Densified Network
and
Final 3D Coordinates in U.S. Feet, N.J.S.P.C.S. 1983

00903-2


N.J.S.P.C.S. 1983
GRAPHIC SCALE
1000
0
500
1000
2000
4000
(IN FEET)
1 inch = 1000 ft.
Project 94938

00903-3

Prepared by: G.E.O.D. Inc. #CGPS04170
List-Coordinates/Brg-Azi 94938 10/10/94 14:00:59 Factor: 1.0000000

Pt.No.	Code	North	East	Elevation	Desc.
200		692424.008	590861.356	13.160	TR-X
201		692272.584	590036.173	17.849	TR-MON
202		691973.109	589136.234	22.078	TR-X
203		691986.615	587974.212	13.918	TR-X
204		691958.601	586994.872	17.092	TR-X
205		692144.377	586014.528	17.211	TR-X
206		692986.523	585341.888	16.988	TR-PK
207		693204.504	584777.909	32.504	TR-X
208		693826.438	584864.098	28.896	TR-X
209		694500.358	584805.304	20.856	TR-H&T
210		695043.662	584760.627	21.685	TR-X
211		695485.955	584483.777	35.609	TR-X
212		695987.410	584342.982	37.437	TR-X
213		696302.155	584357.104	27.860	TR-X
214		696655.313	584406.726	18.589	TR-X
215		697013.299	584373.504	13.613	TR-X
216		696888.635	584010.076	39.132	TR-X
217		696729.263	583579.045	38.633	TR-X
218		696628.544	587431.245	33.677	TR-X
219		696820.239	586354.550	21.881	TR-X
220		696677.336	585645.864	11.824	TR-X
221		696536.548	584948.846	14.444	TR-X
222		693157.379	589227.686	12.558	TR-PK
223		692952.418	588797.597	12.052	TR-X
224		696058.794	587426.217	31.203	TR-X
225		692684.685	590950.438	12.815	TR-PK
226		692921.390	590690.361	8.873	TR-X
227		692272.512	589895.464	16.298	TR-RBAR
228		692187.457	588462.612	8.234	TR-X
229		692150.103	587448.283	7.000	TR-X
230		692375.497	586600.596	6.723	TR-PK
231		693112.206	585715.459	7.115	TR-RBAR
232		694357.153	585166.732	8.589	TR-SPK
233		694843.636	585052.758	7.716	TR-X
234		697049.736	584513.724	4.904	TR-RBAR
235		697022.542	584484.219	8.095	TR-PK
236		696007.769	584481.495	37.839	TR-PK
237		695436.120	584688.453	38.444	TR-PK
238		695514.869	584728.836	12.462	TR-H&T
239		695227.758	584855.971	8.915	TR-H&T
240		695055.920	584910.871	14.749	TR-PK
241		694853.931	585010.429	17.736	TR-H&T
242		692853.428	585745.016	9.241	TR-SPK
243		692563.097	586006.866	9.230	TR-PK
244		692478.298	586169.157	10.685	TR-PK
245		692262.755	586206.169	14.586	TR-SPK
246		692104.505	586409.025	17.746	TR-X
247		692476.749	586324.008	7.921	TR-PK
248		692329.958	586326.376	9.045	TR-PK

249	692241.278	586513.419	7.936	TR-PK
250	692131.337	586757.866	8.288	TR-PK
251	692238.643	586916.923	7.793	TR-PK
252	692161.049	587314.048	7.290	TR-PK
253	692027.569	587186.348	13.133	TR-PK
254	692062.126	587497.952	9.989	TR-H&T
255	692145.624	587673.384	7.721	TR-H&T
256	692085.427	588056.634	13.854	TR-X
257	692619.329	591120.658	12.292	TR-PK
258	692365.016	590278.821	16.439	TR-PK
259	693571.946	585221.671	10.170	TR-H&T
260	693232.819	585327.439	9.338	TR-PK
261	693079.070	585421.252	12.117	TR-X
262	693308.977	585560.169	8.090	TR-H&T
265	692078.118	587693.240	26.894	TR-PK
7277	697787.550	587206.870	41.783	
7278	697018.750	587358.980	30.068	M-USGS
7279	694754.450	587550.000	8.862	M-USGS

JOSEPH G. MINISH
PASSAIC RIVER WATERFRONT
PARK AND HISTORIC AREA

CONTROL REPORT
Prepared by GEOD Corporation

SECTION 2

TIE SKETCHES

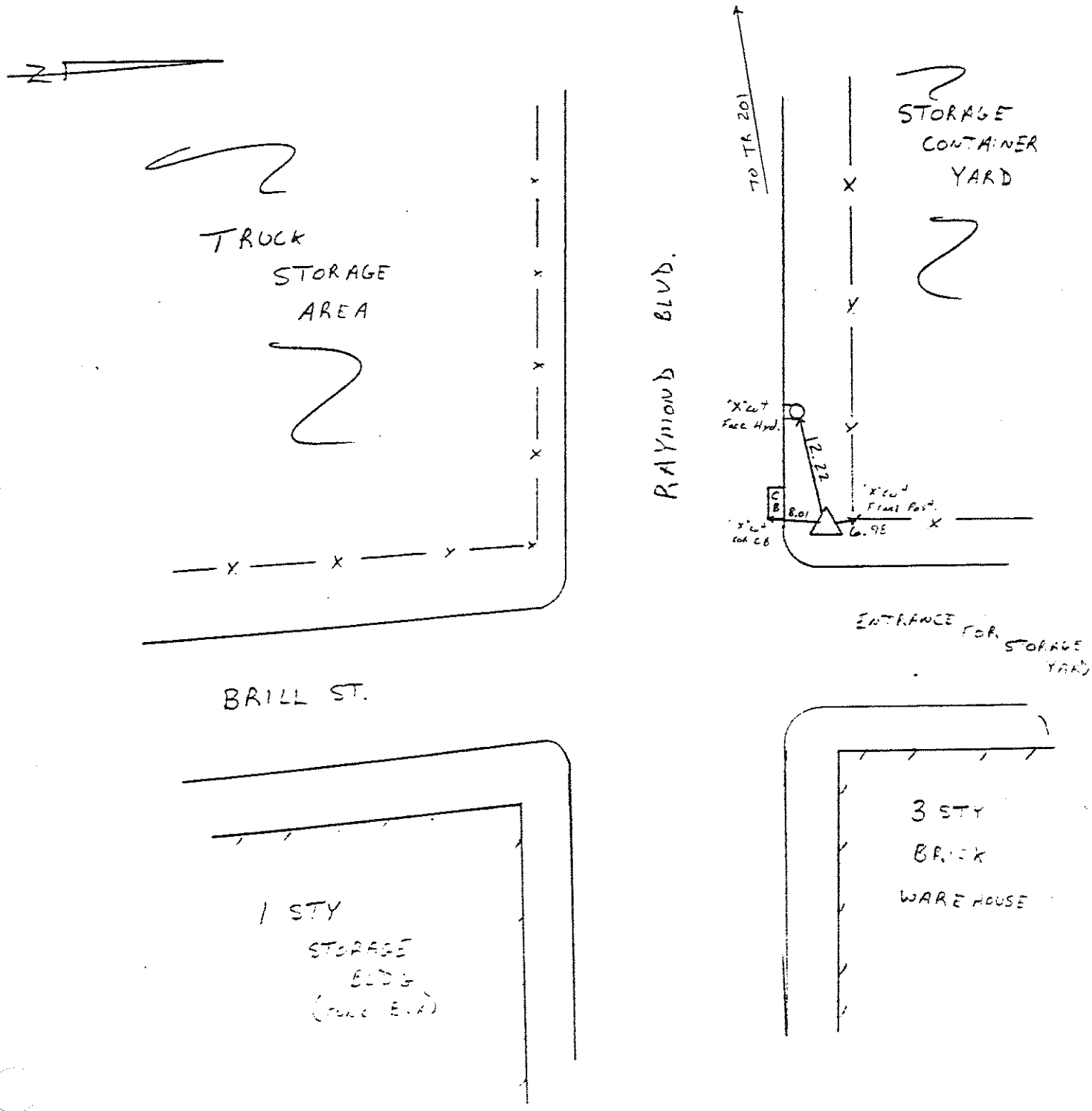
00903-6

GEOD CORPORATION
PHOTOGRAMMETRIC SCIENCES — SURVEY TECHNOLOGIES
16-24 Kanouse Road, Newfoundland, NJ 07435
(201) 697-2122 / Fax 201-838-6433

Sheet 2 of 2

Party SWL RK AH Date 5 Jul 94 Job No. 94-938

Weather 90°-Hazy Description TR 200-X-cut



00903-7

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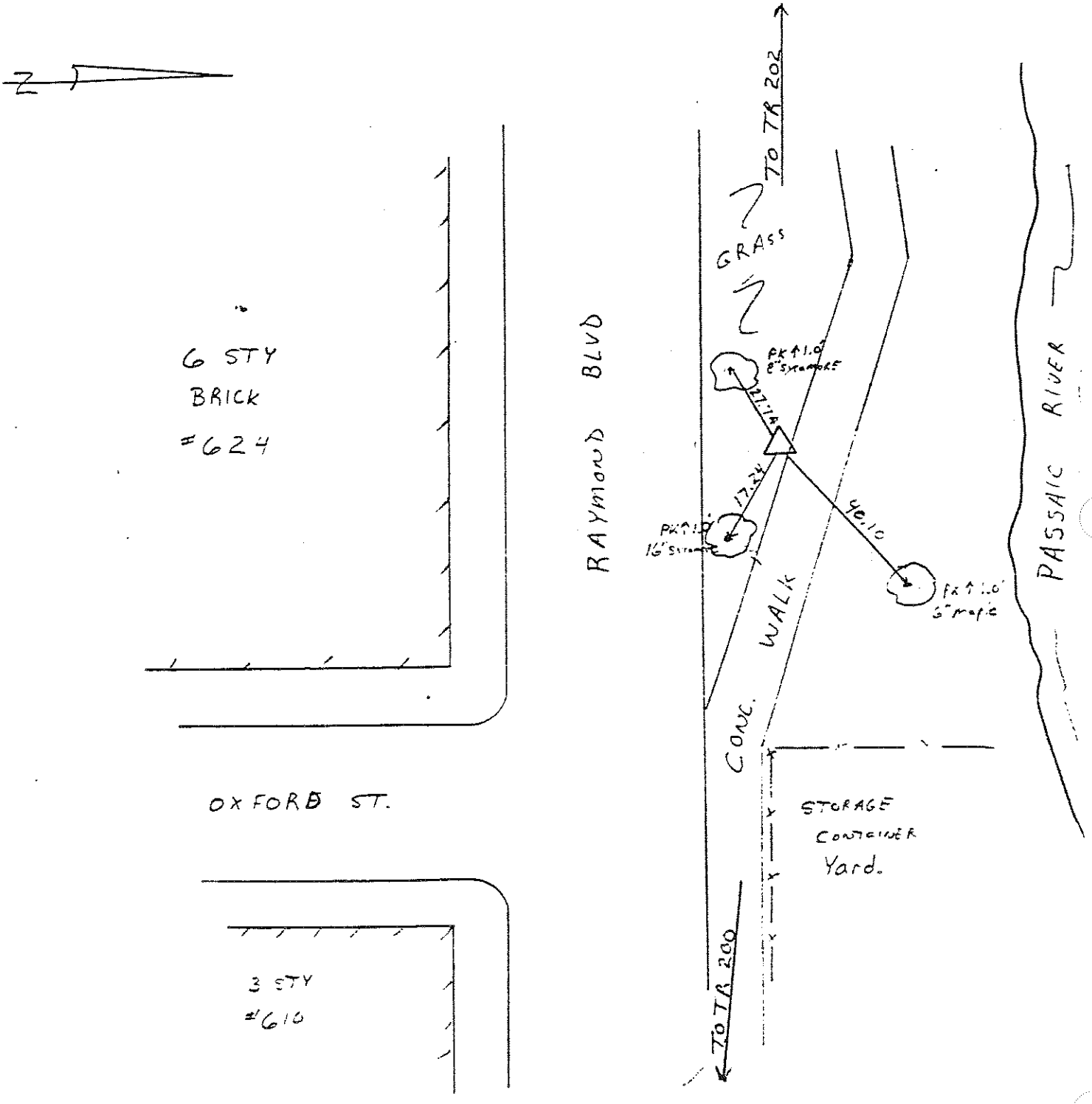
PHOTOGRAMMETRIC SCIENCES — SURVEY TECHNOLOGIES
16-24 Kanouse Road, Newfoundland, NJ 07435
(201) 897-2122 / Fax 201-838-6433

Party SWD RK AH Date 5 Jul 94 Job No. 94-938

Weather 90° Hazey Description TR 201 - GEOD Disk

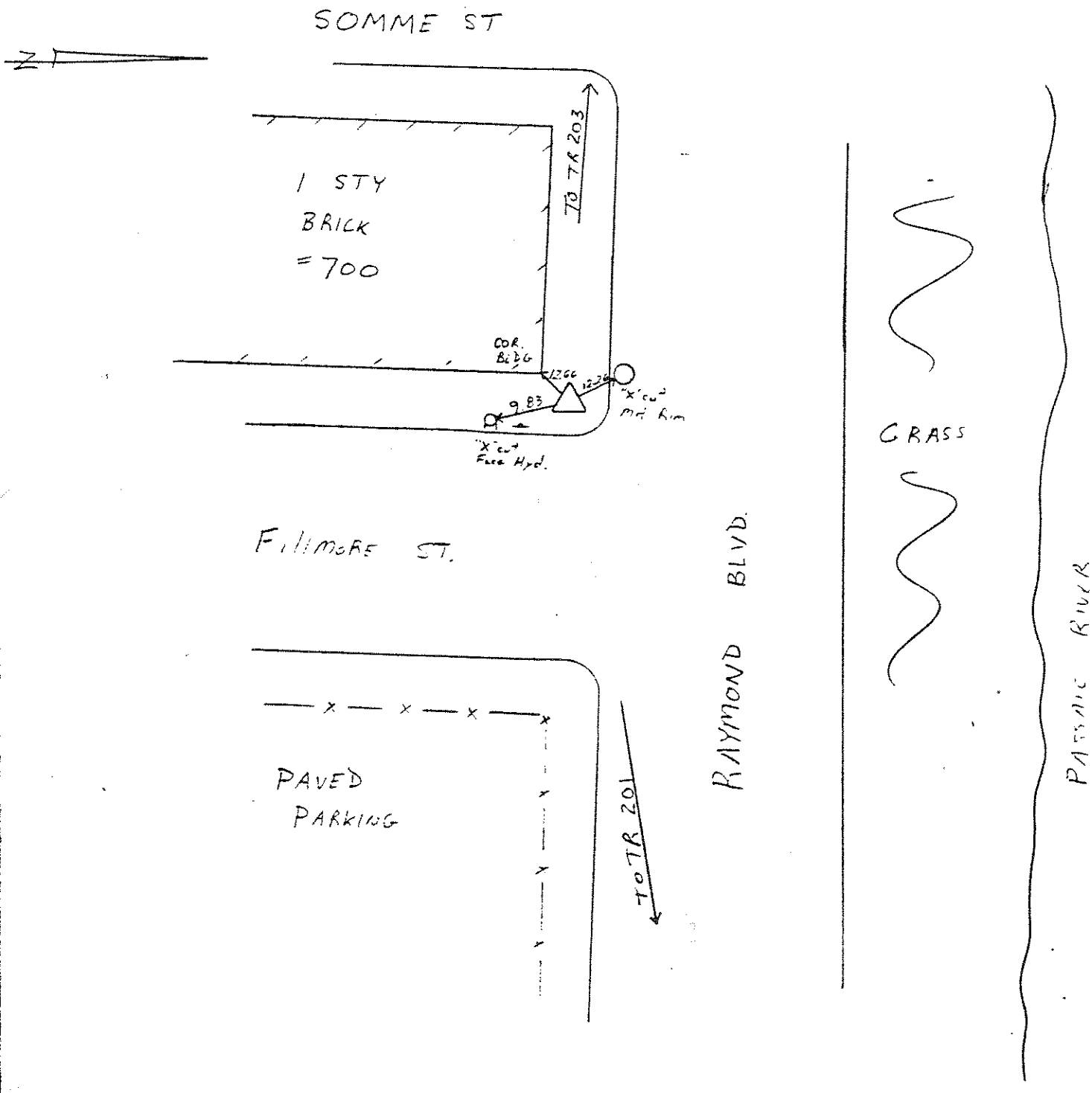


GEOD CORPORATION
PHOTOGRAMMETRIC SCIENCES — SURVEY TECHNOLOGIES
16-24 Kanouse Road, Newfoundland, NJ 07435
(201) 697-2122 / Fax: 201-838-6433

Sheet 1 of 8

SWD RK AH Date 6 Jul 94 Job No. 99-938

Weather 85°-Hazey Description TR 202-"X"-cut



00903-9

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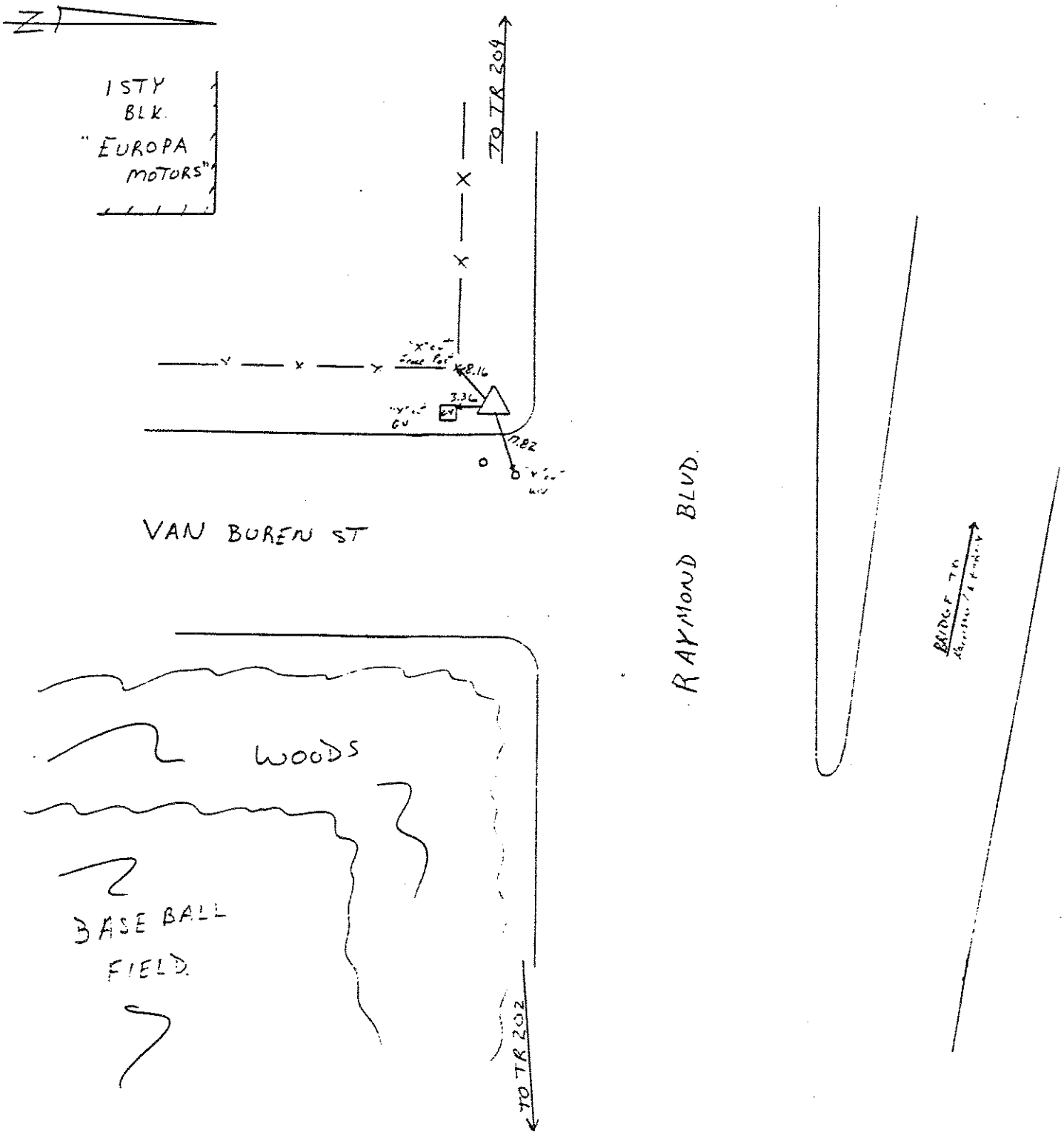
Sheet 2 of 8

Party SWD, RK, AH Date 6 Jul 09 Job No. 94-938

Weather 85° Hazy Description TR 203 "X" out



00903-10

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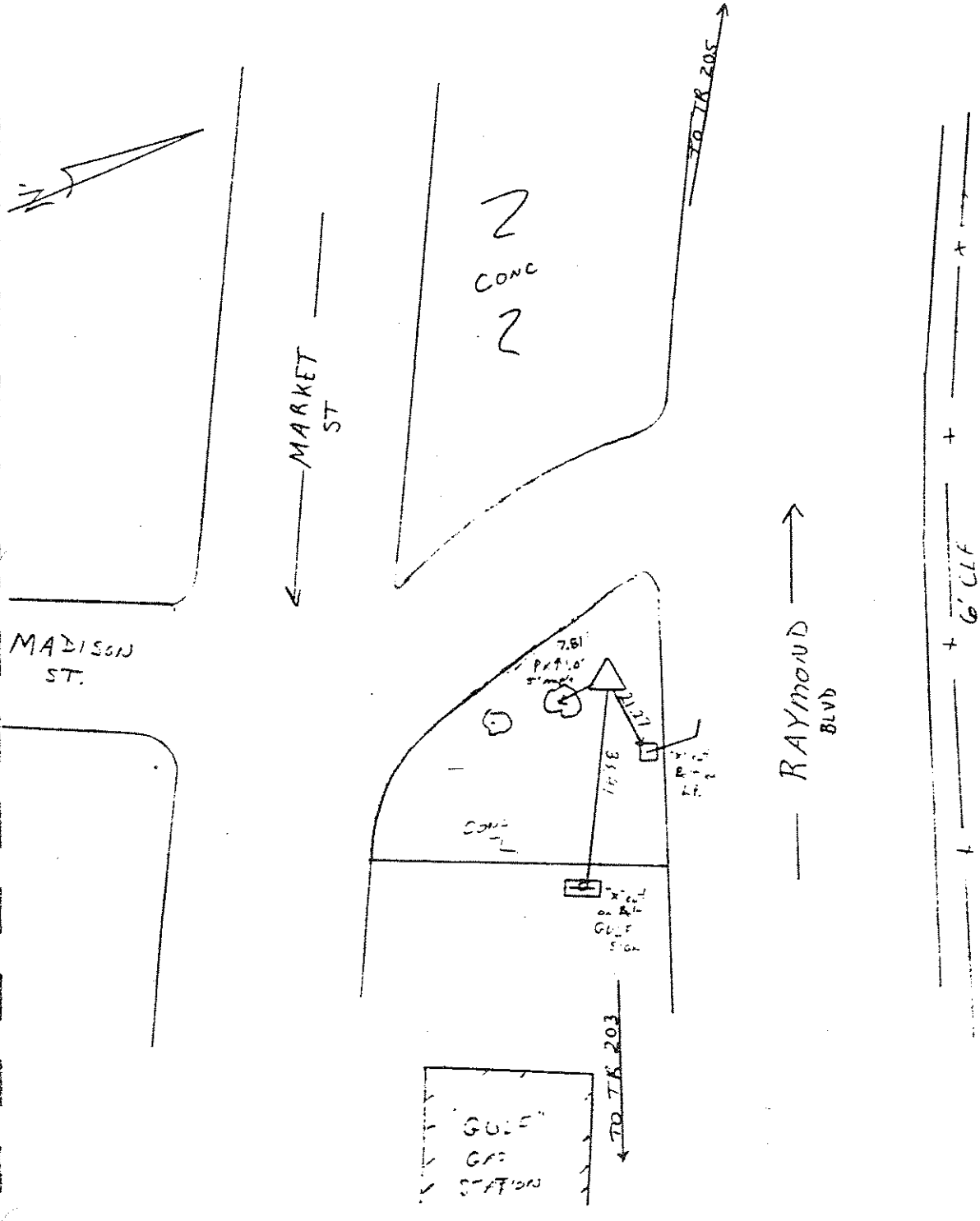
Sheet 3 of 8

1 SWD RK AH Date 6 Jul 94 Job No. 94-938

Weather 90°- SUNNY Description TR 204 - X'cut



00903-11

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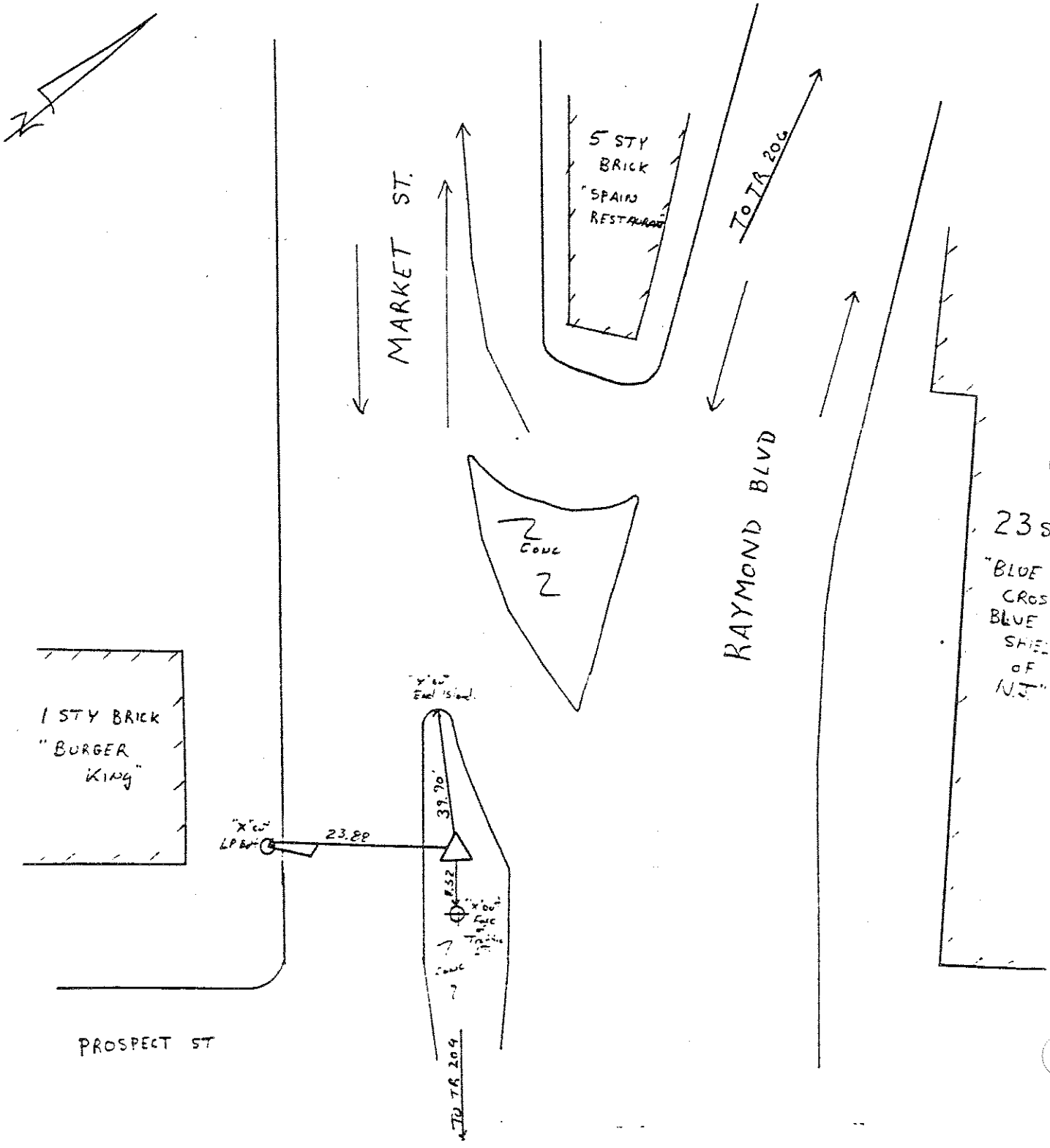
Sheet 4 of 8

Party SWD RK AH Date 6 Jul 94 Job No. 94-939

Weather 90°-Sunny Description TR 205- "X" cut



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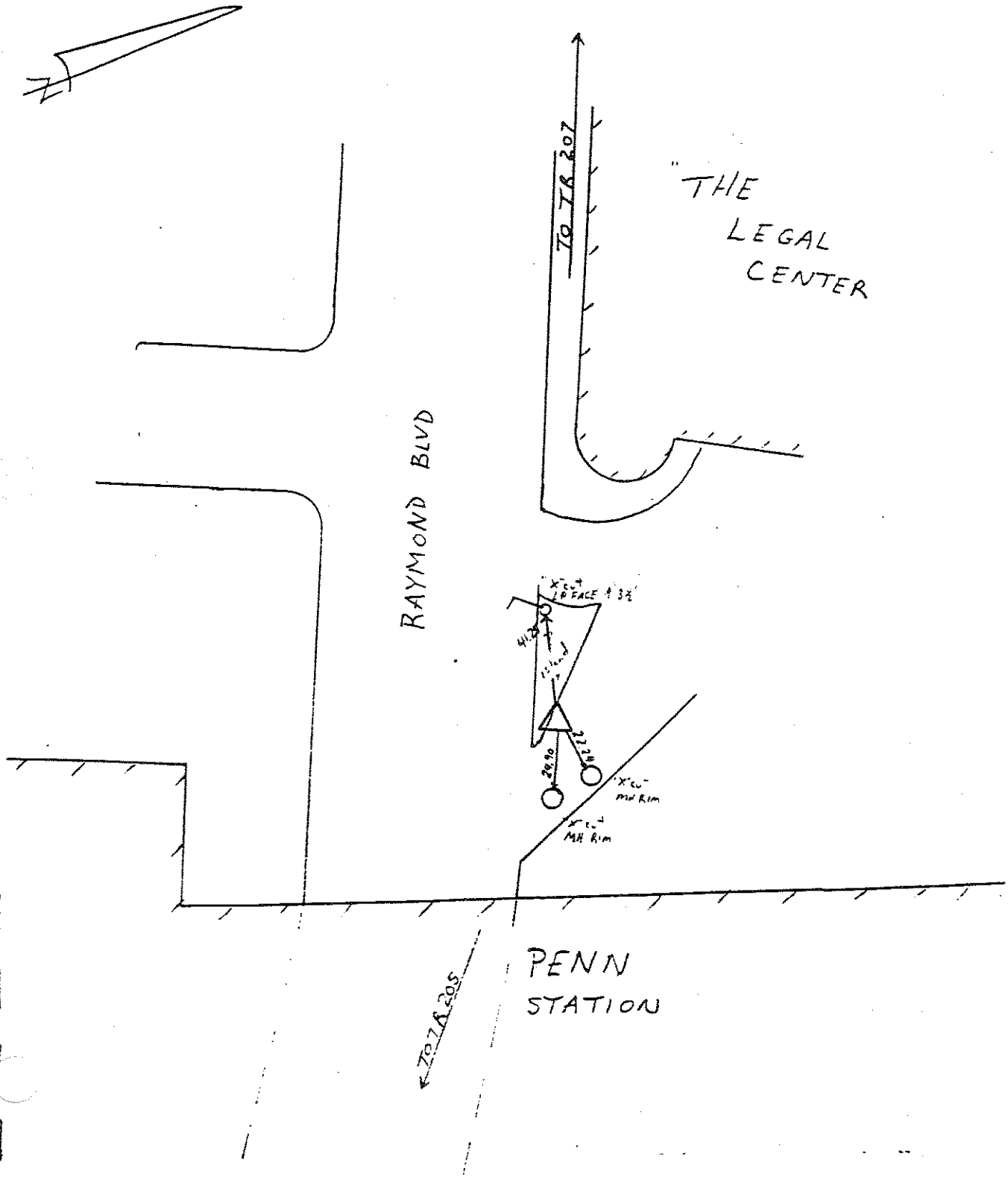
Sheet 5 of 8

y SWD RK AH Date 6 Jul 94 Job No. 94-938

Weather 90°- Sunny Description TR 206-PK



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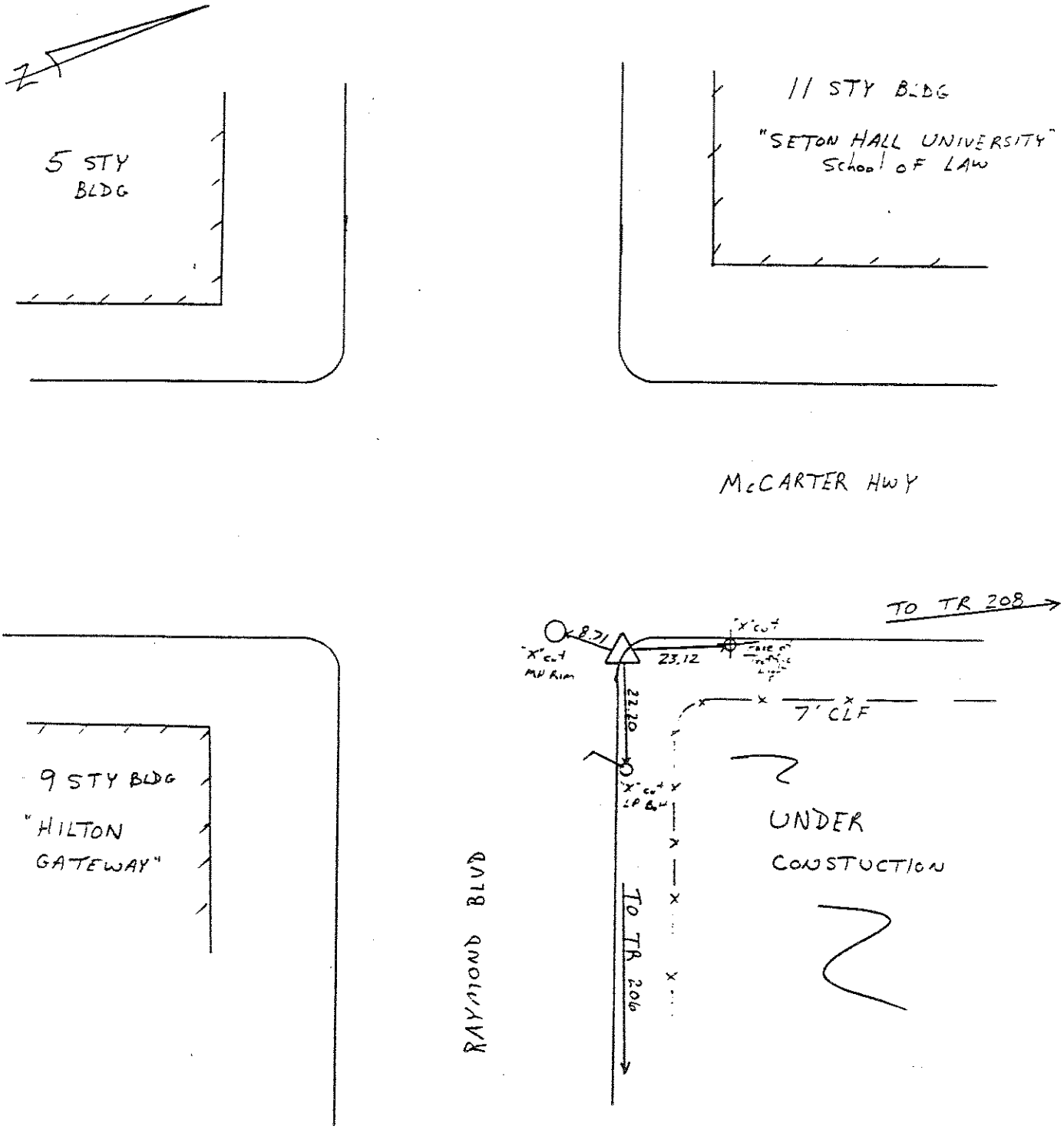
Party SWD, RK, AH Date 6Jul94 Job No. 94-938

Weather 90°- Sunny Description TR 207-"X"-cut



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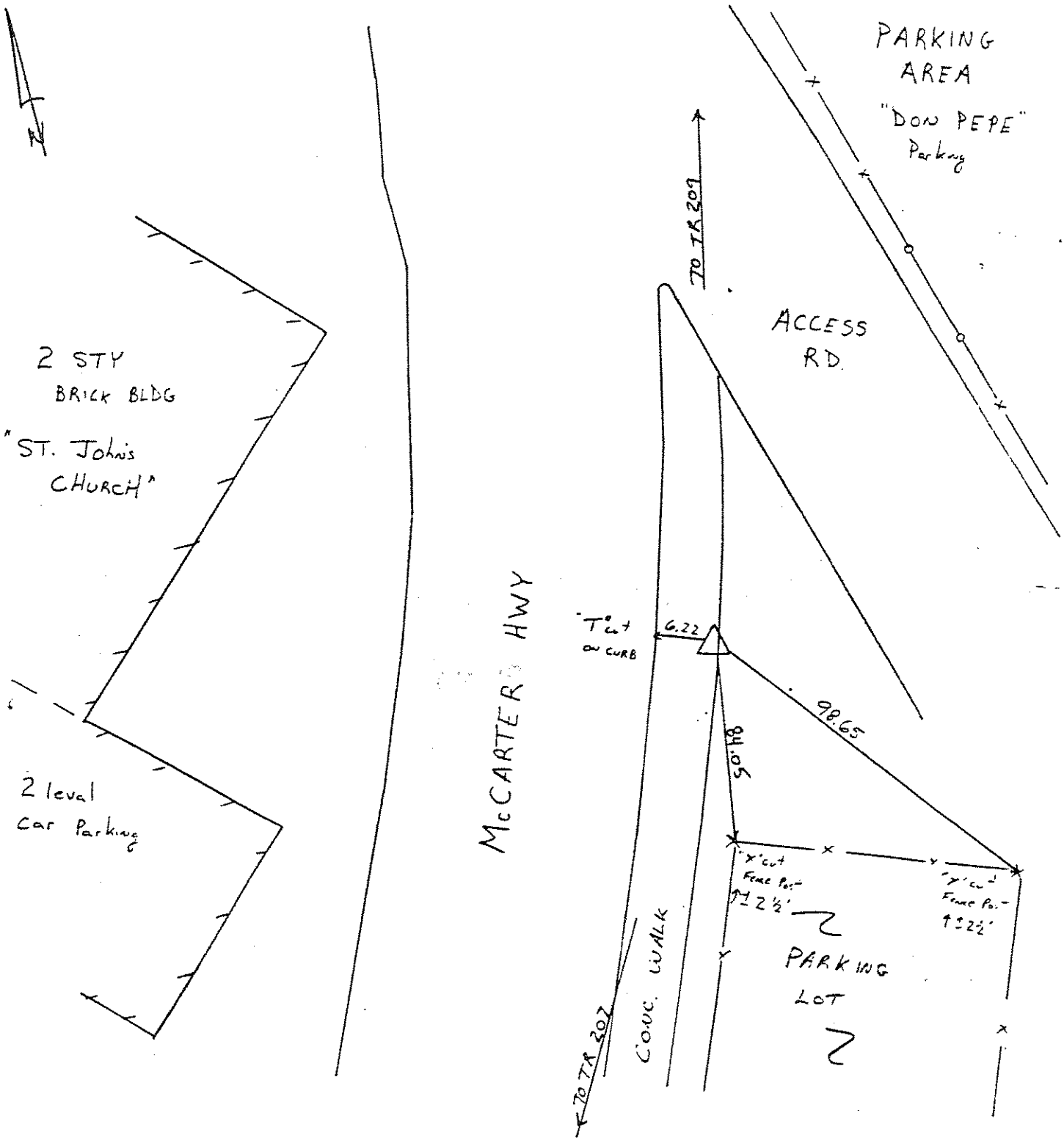
SWD, RK, AH Date 6 Jul 94 Job No. 94-932

Weather 90° Sunny Description TR 208 - 'X' cut



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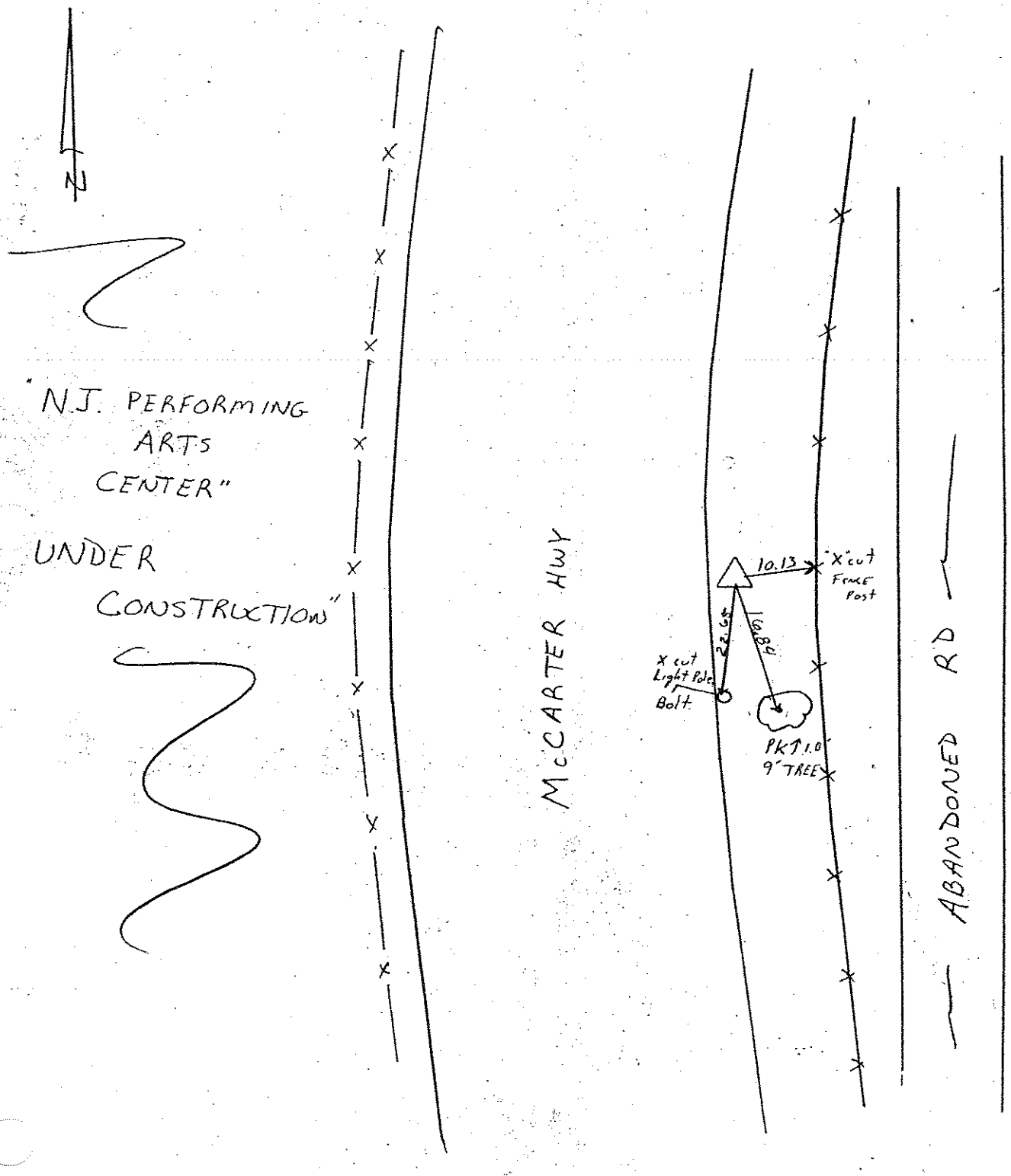
ty SWD, RK, AH Date 6 Jul 94 Job No. 94-938

Weather 90°- Sunny Description TR 209- H/T



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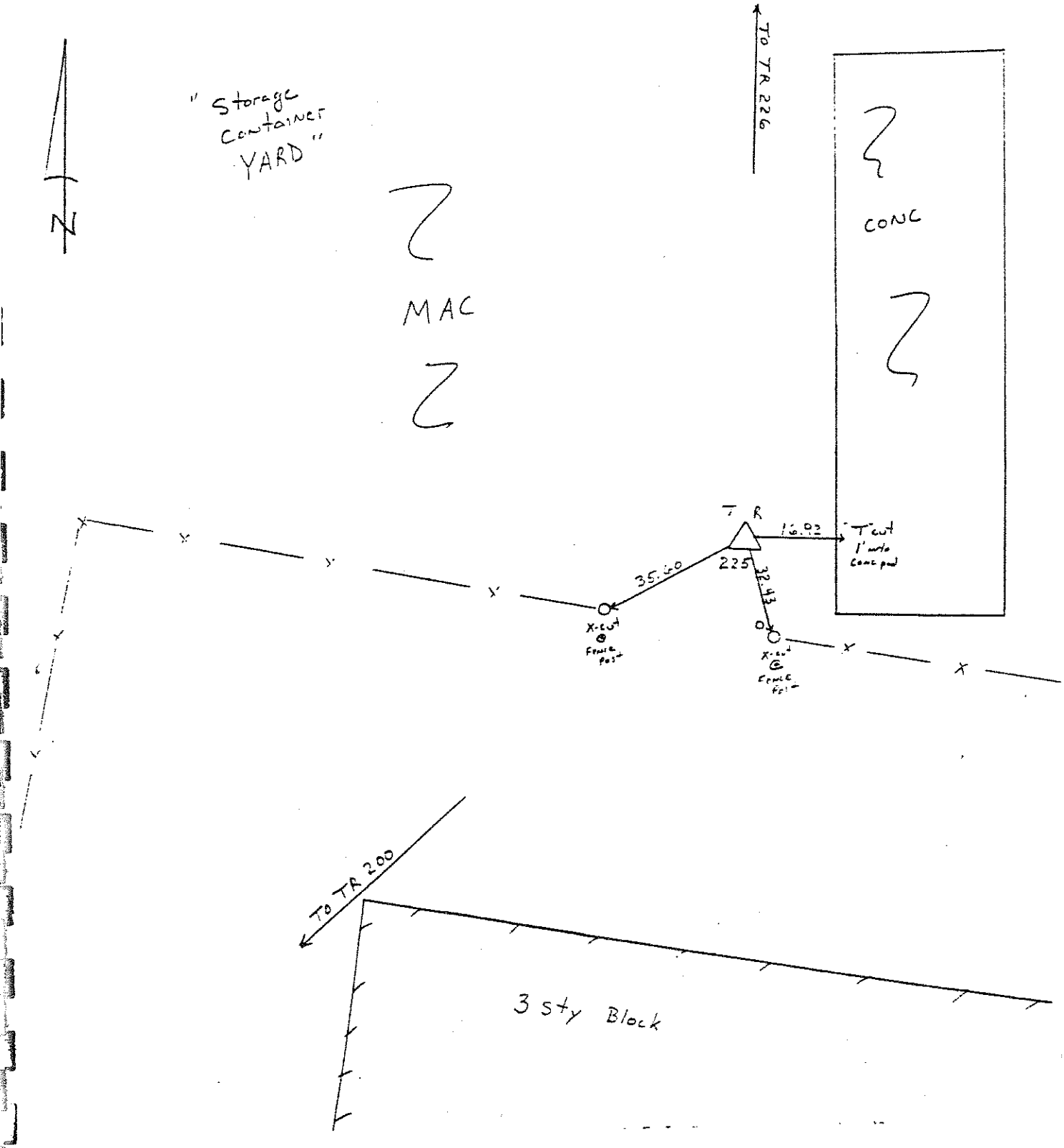
Party SWD, AH Date 29 Jul 94 Job No. 94-938

Weather 85°-cloudy Description TR 225 - "Pk nail"



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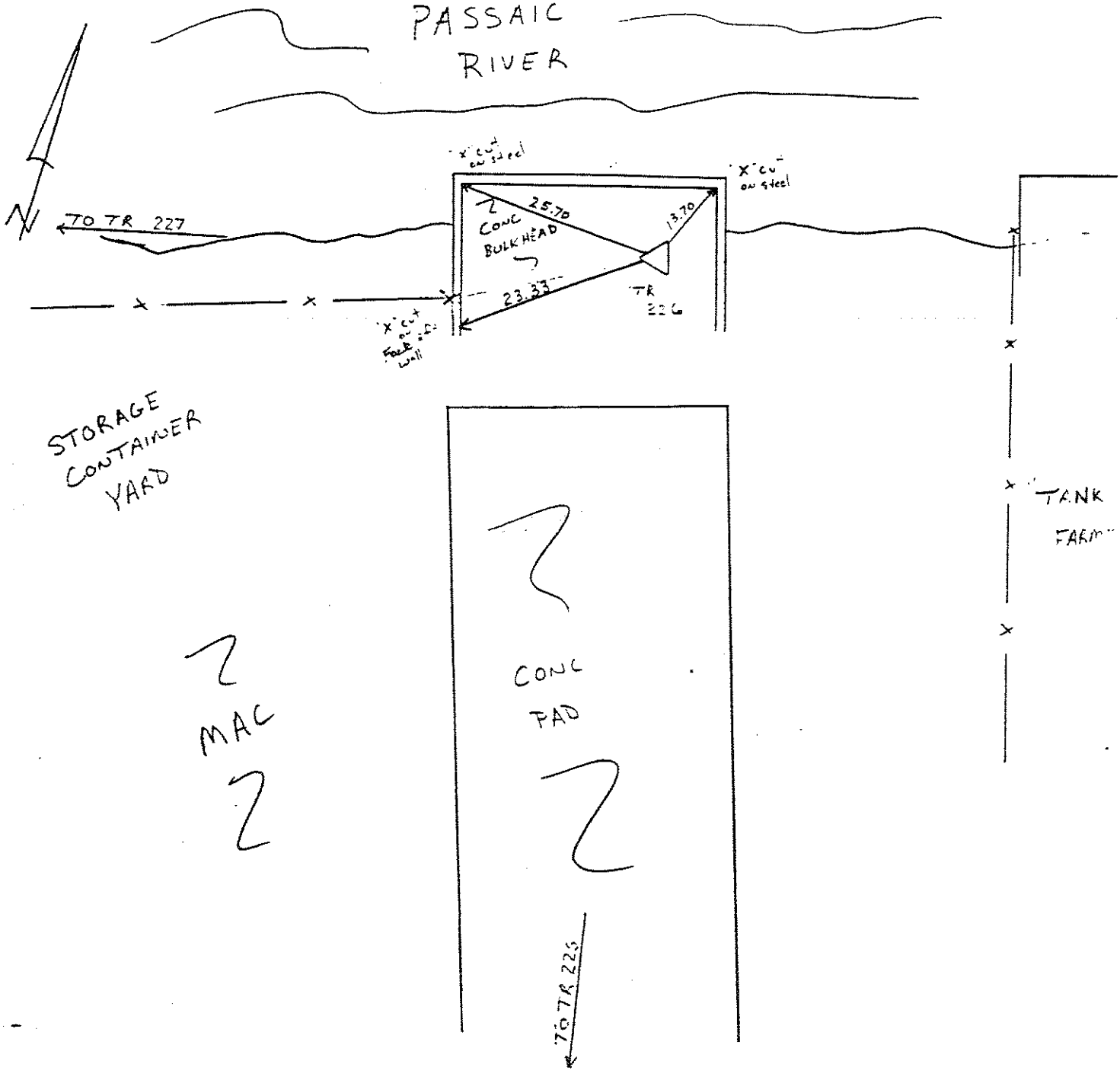
SWD, AH Date 29 Jul 94 Job No. 94-938

Weather 85° - SUNNY Description TR 226 - 'x' cut



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00903-18

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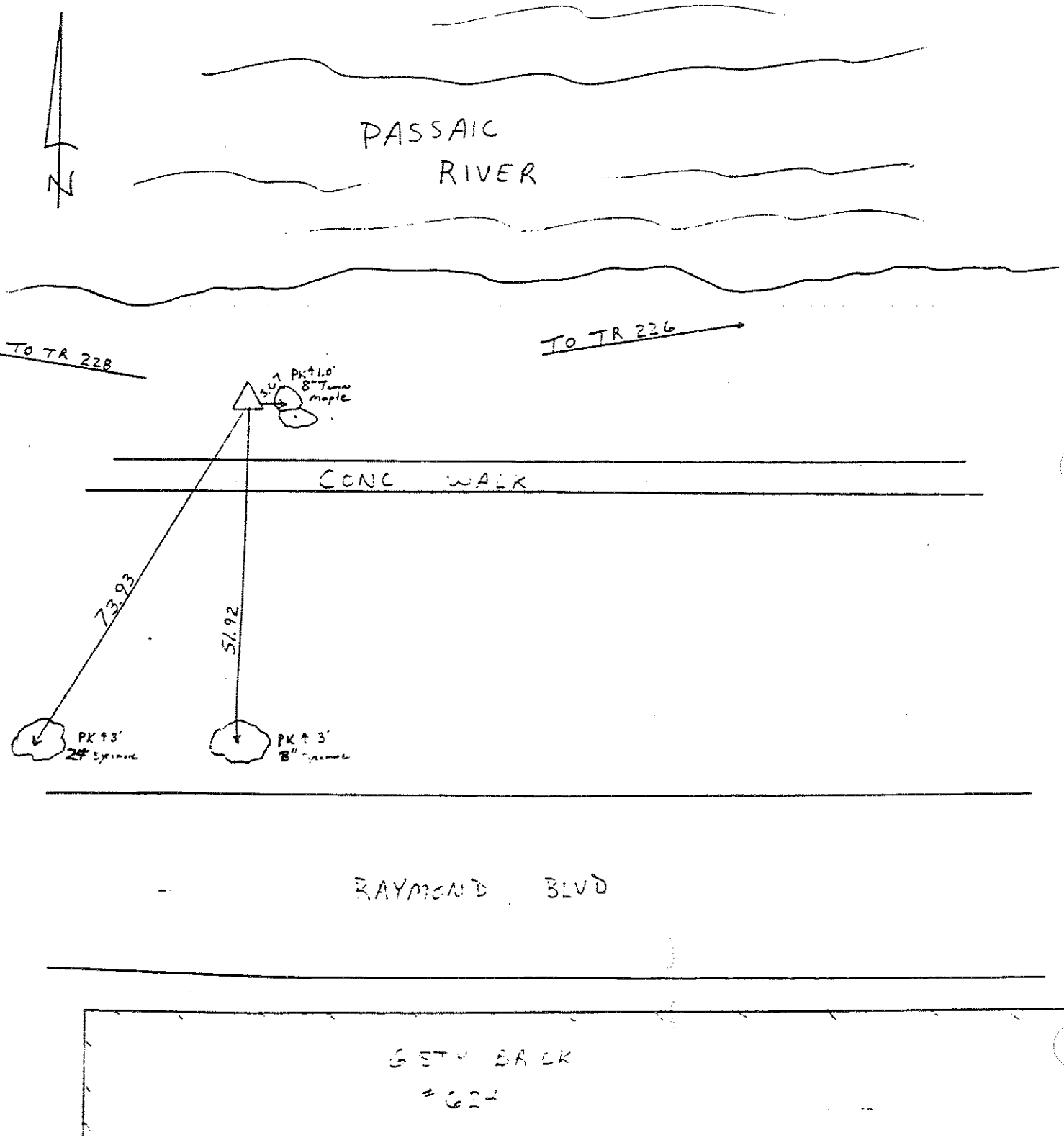
Party SWD AH Date 29 JUL 94 Job No. 94-038

Weather 85° Sunny Description TR 227 - REBAR W/CAP



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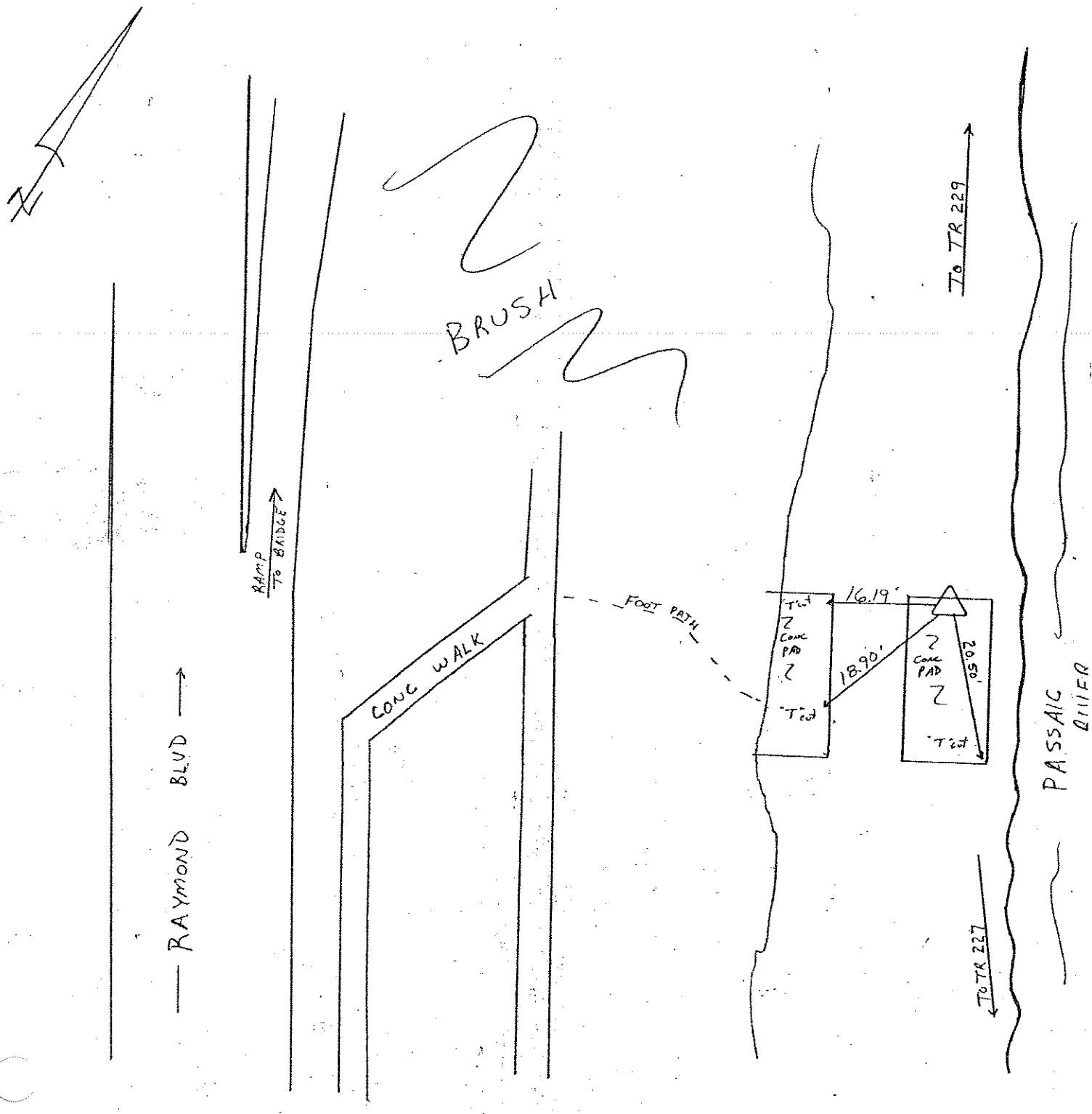
By SWD, AH Date 29Jul94 Job No. 94-938

Weather 85°-Sunny Description TR 228-'x'cut



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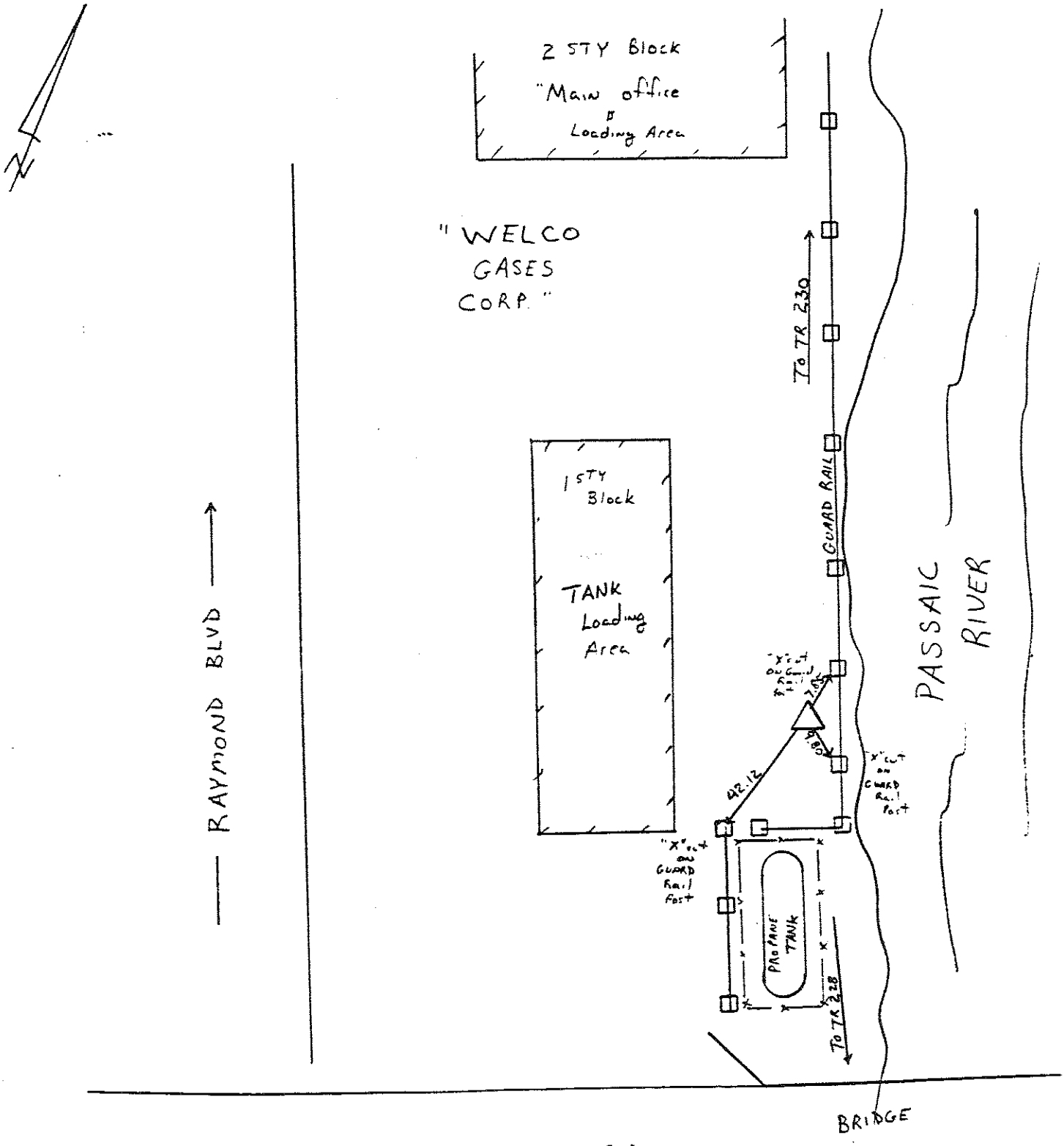
F. / SWD, AH Date 29Jul94 Job No. 94-938

Weather 85° Sunny Description TR 229 "x" cut



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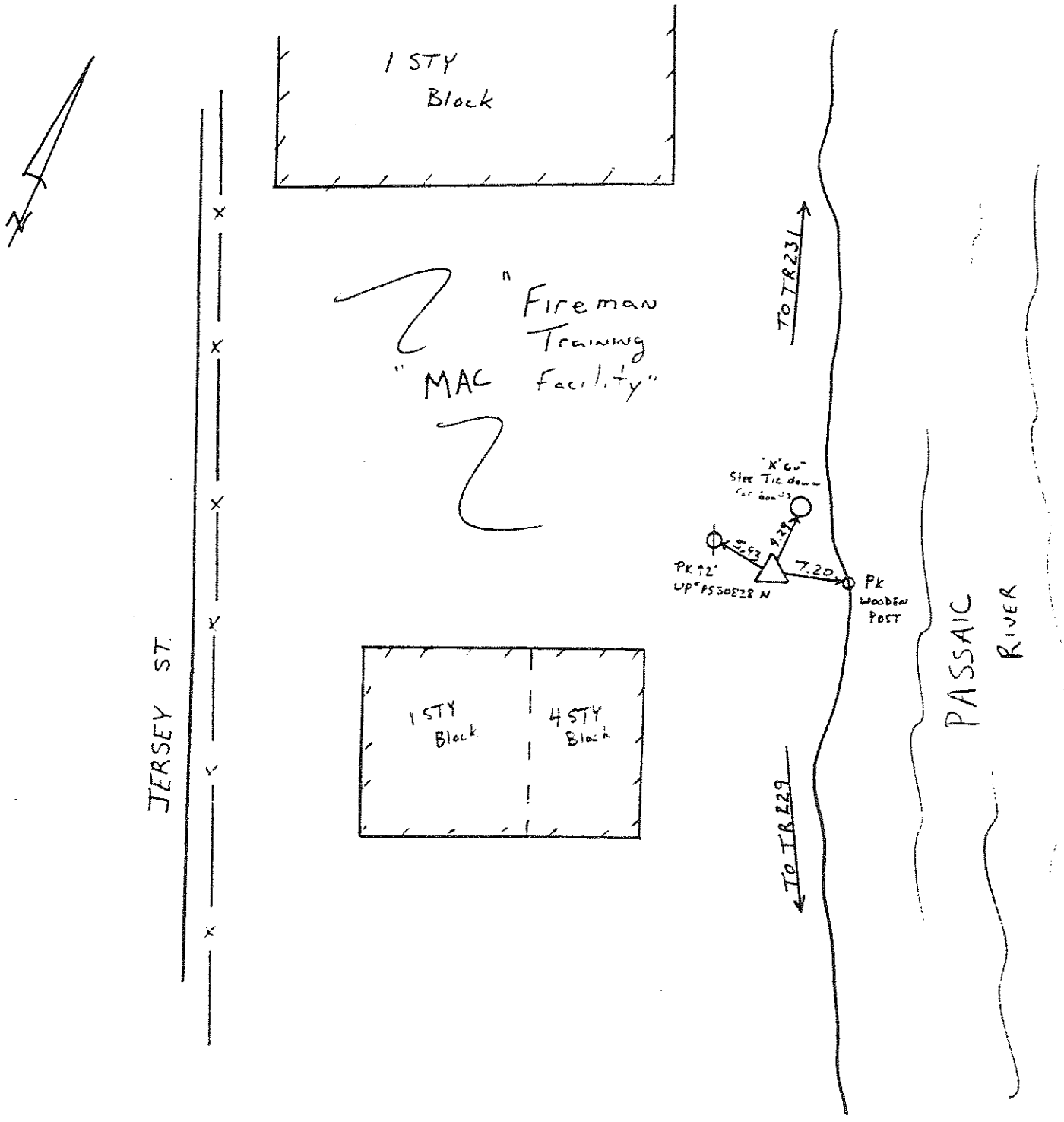
Party SWD AH Date 29 Jul 94 Job No. 94-938

Weather 85°-Sunny Description TR-230 - Pk No. 1



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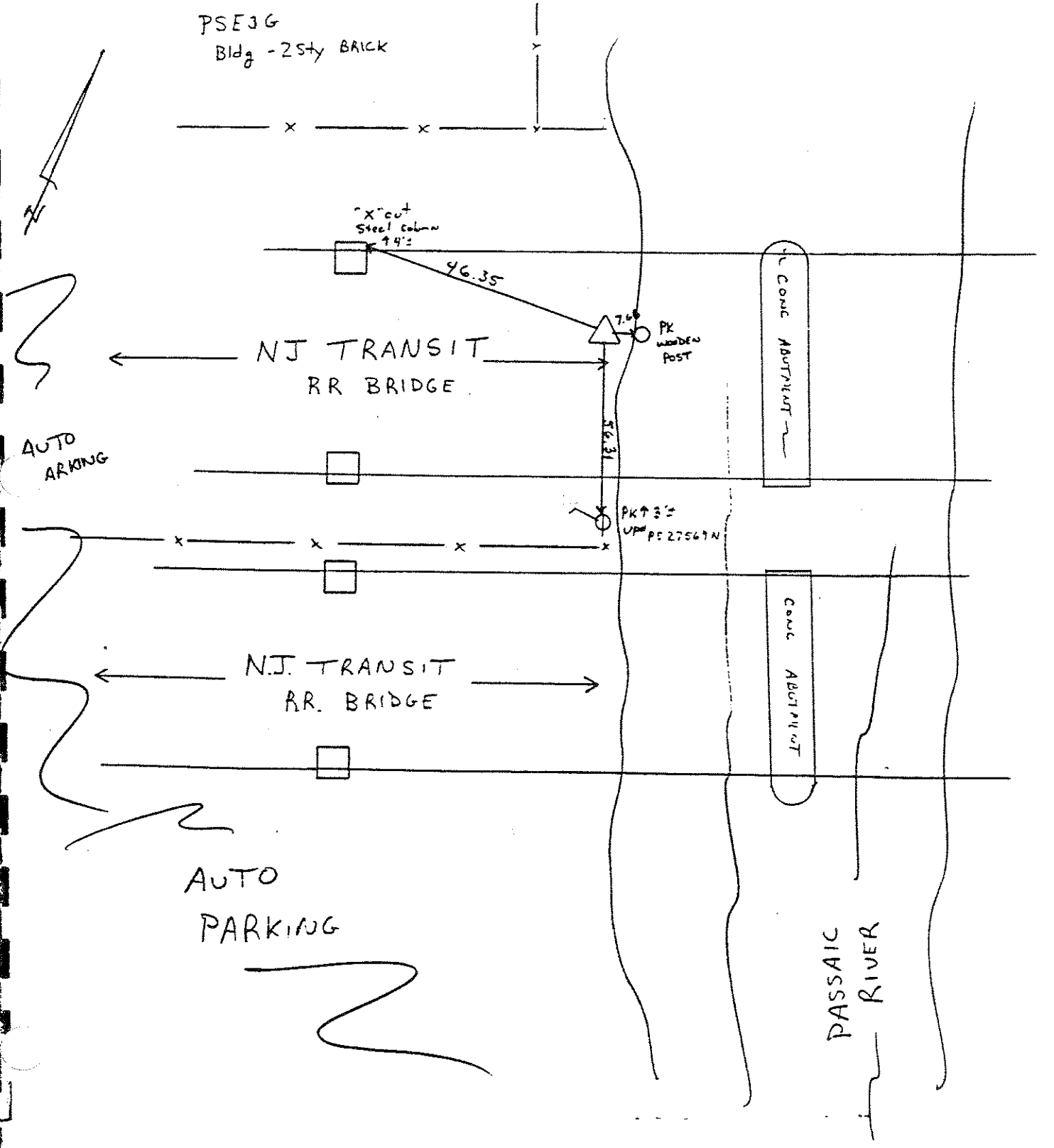
, SWD, AH Date 29 Jul 94 Job No. 94-938

Weather 85°-sunny Description TR 231 - REBAR w/CAP



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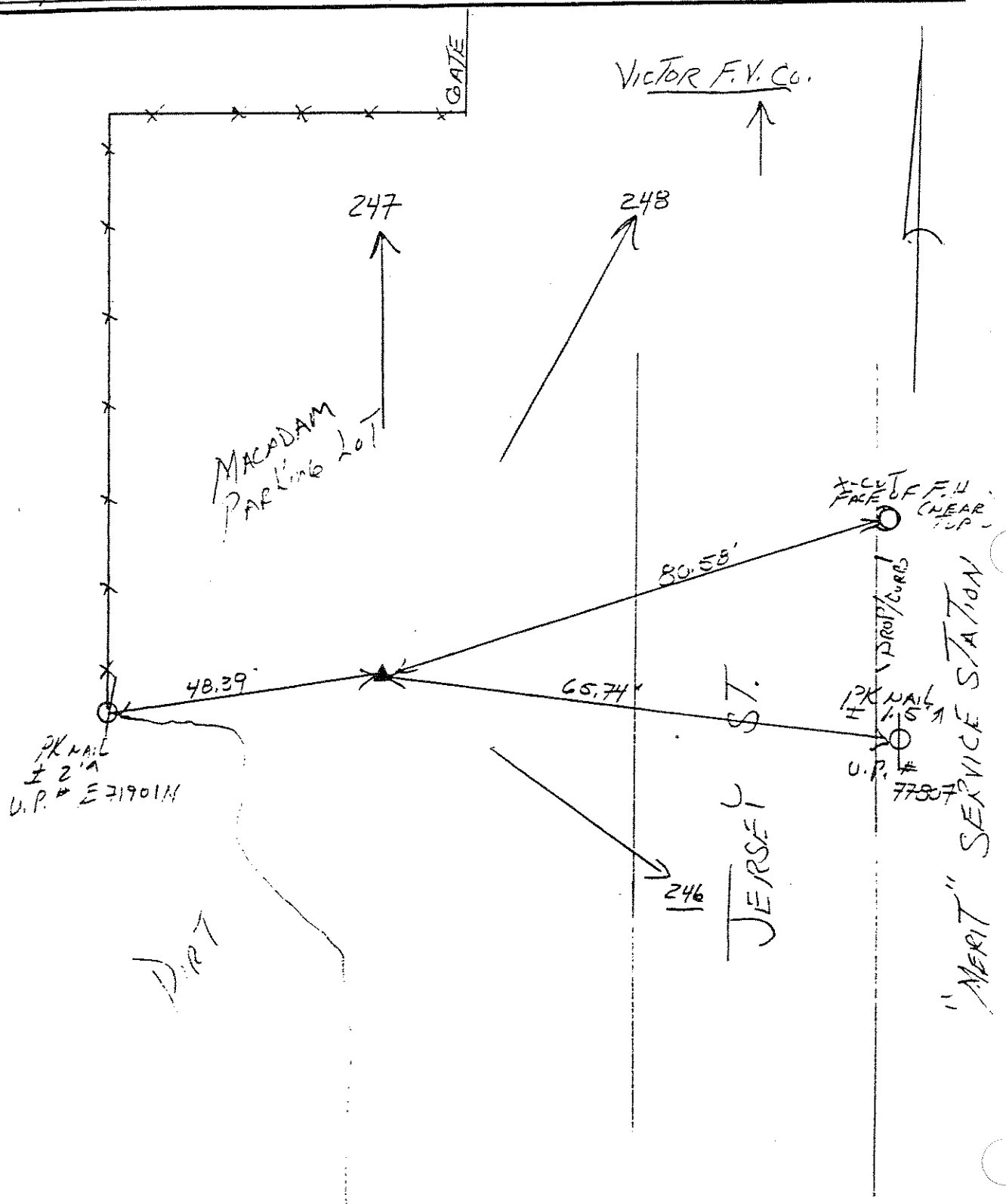
Sheet _____ of _____

Party S.D, A.H. RRD, J.G.Z, M.V Date 9-14-94 Job No. 94-938

Weather 80° P.CLDY Description TIE SKETCH, TR 245, RR SPIKE



00903-23

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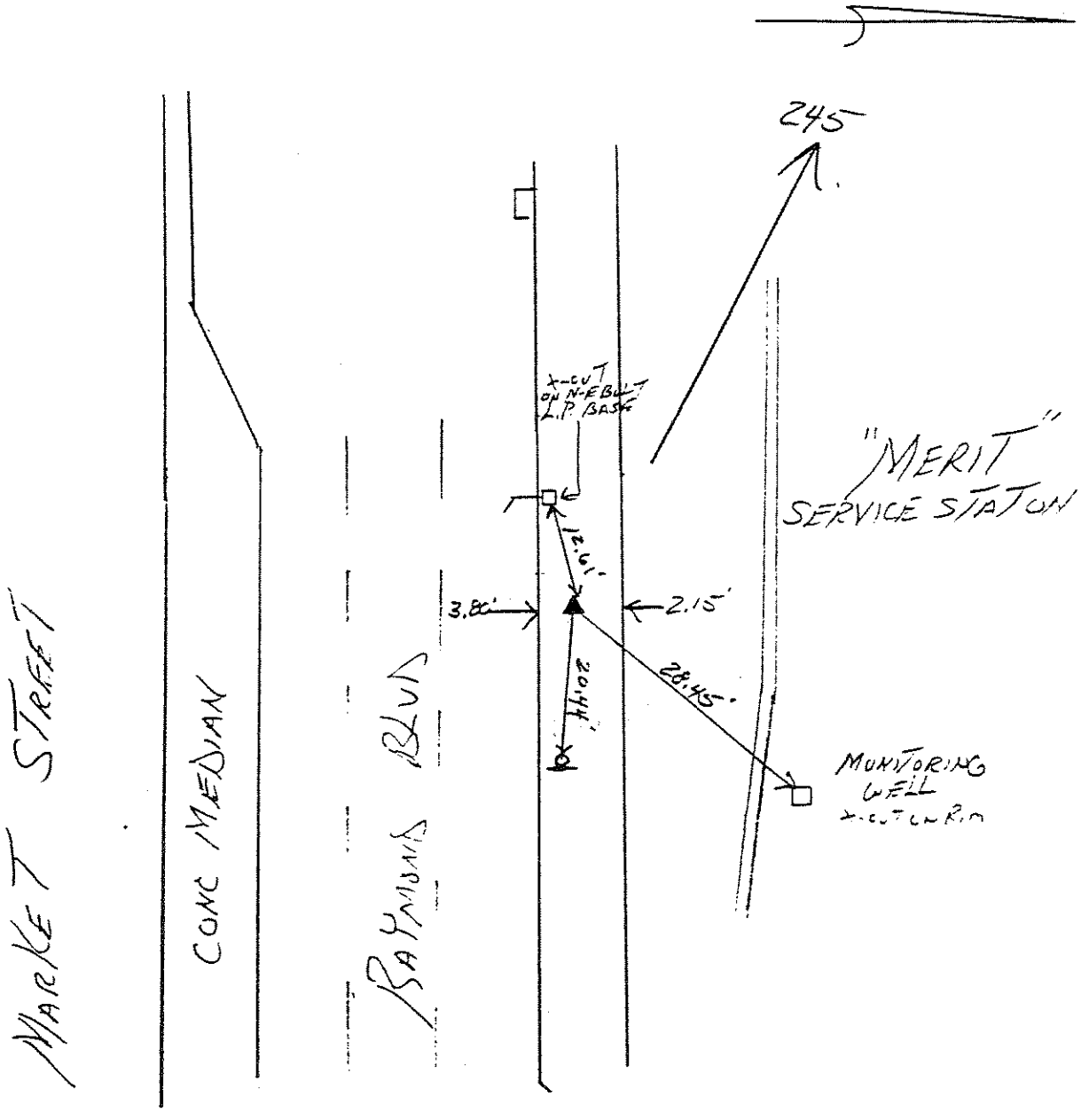
Sheet _____ of _____

y S.D., A.H RRD, J.G., M.V Date 9-14-94 Job No. 94-938

Weather 80° P. CLDY Description TIE SKETCH, TR 246, X-CUT



00903-24

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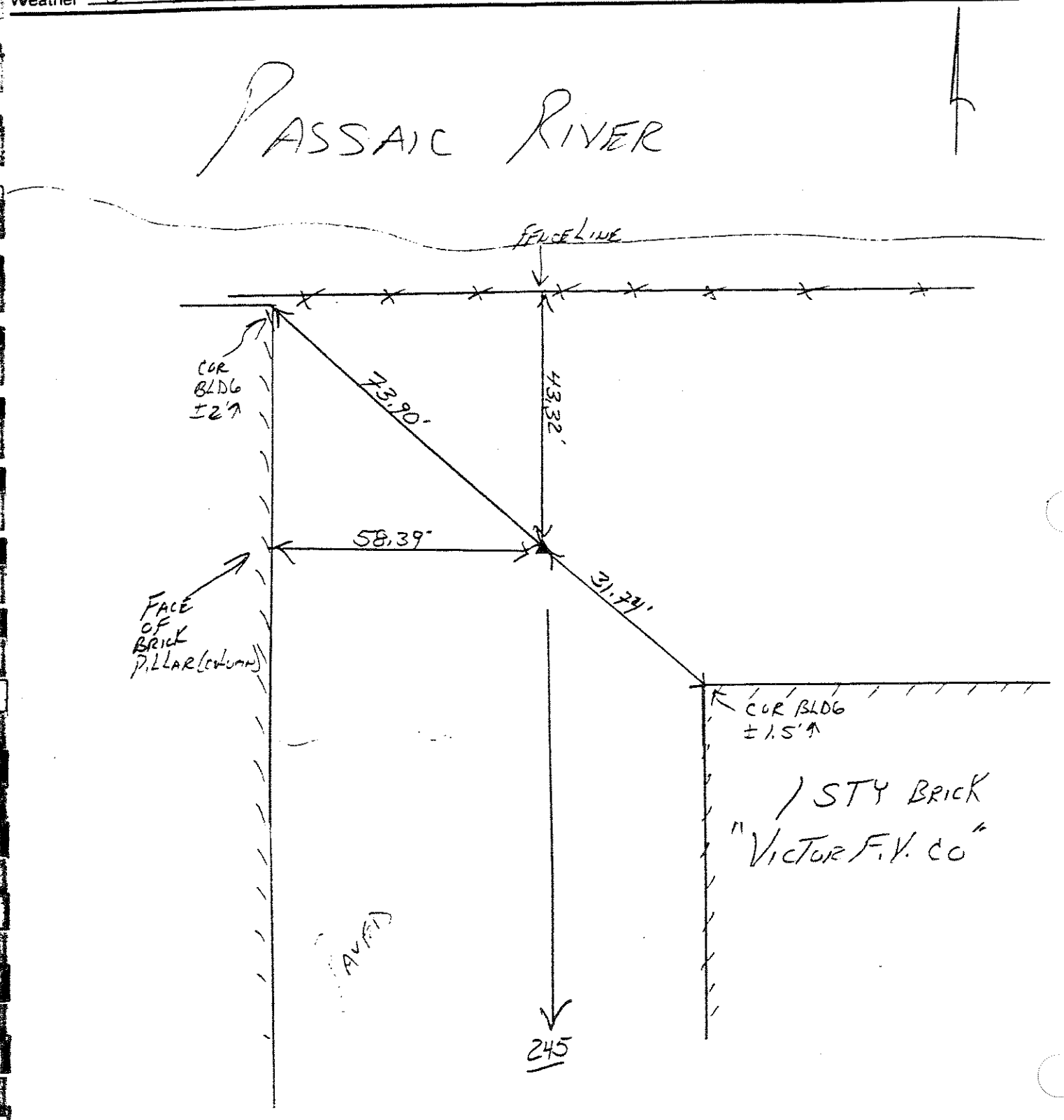
Sheet _____ of _____

Party SD, AH. RRDM, J.G, M.V Date 9-14-94 Job No. 94-938

Weather 80° P.CLDY Description TIE SKETCH; TR 247, PK NAIL



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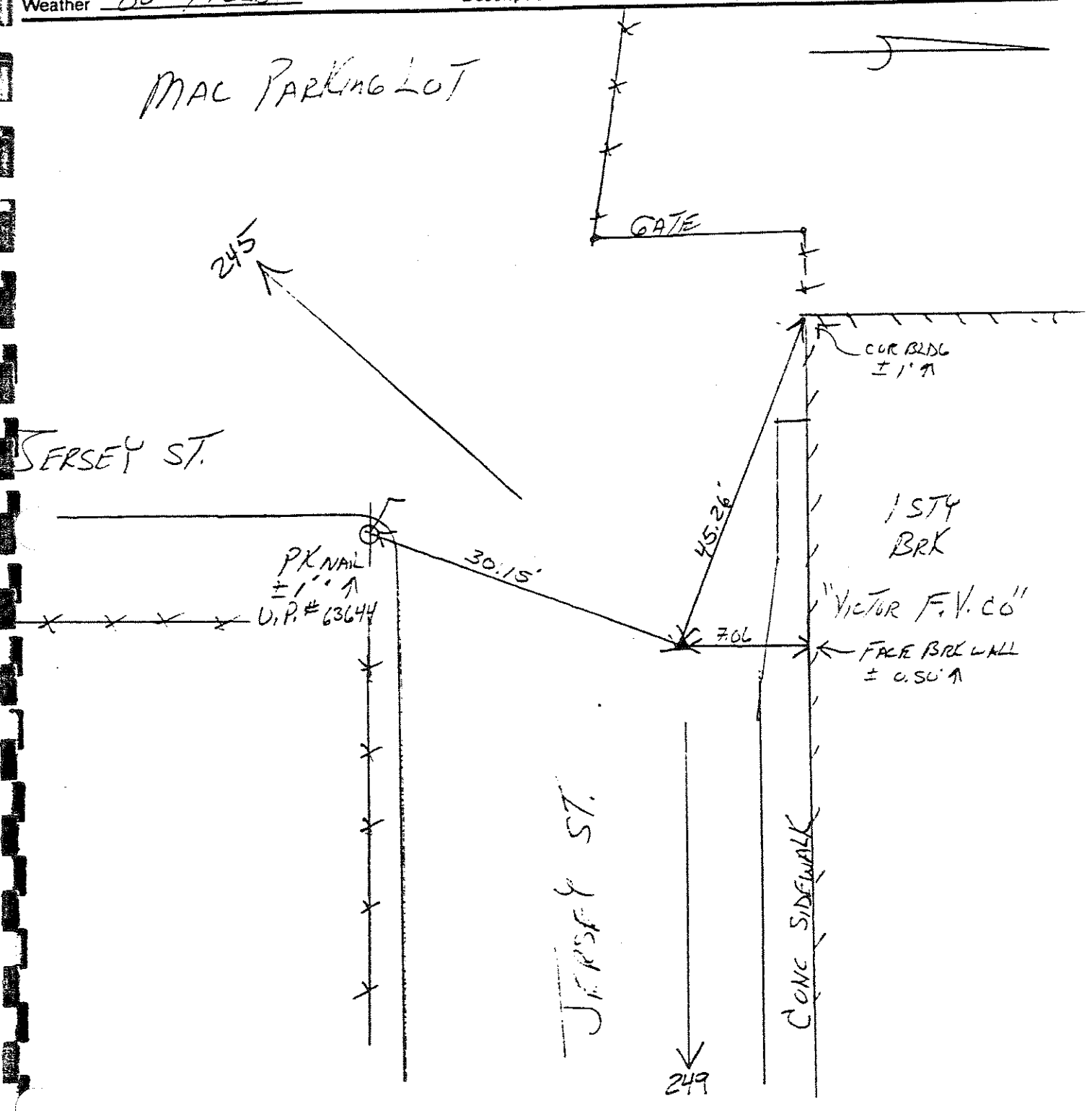
Sheet _____ of _____

S.D, A.H.
RRD, J.G. T, M.V

Date 9-14-94 Job No. 94-938

Weather 80° P. CLDY

Description TIE SKETCH; TR 248, PK NAIL



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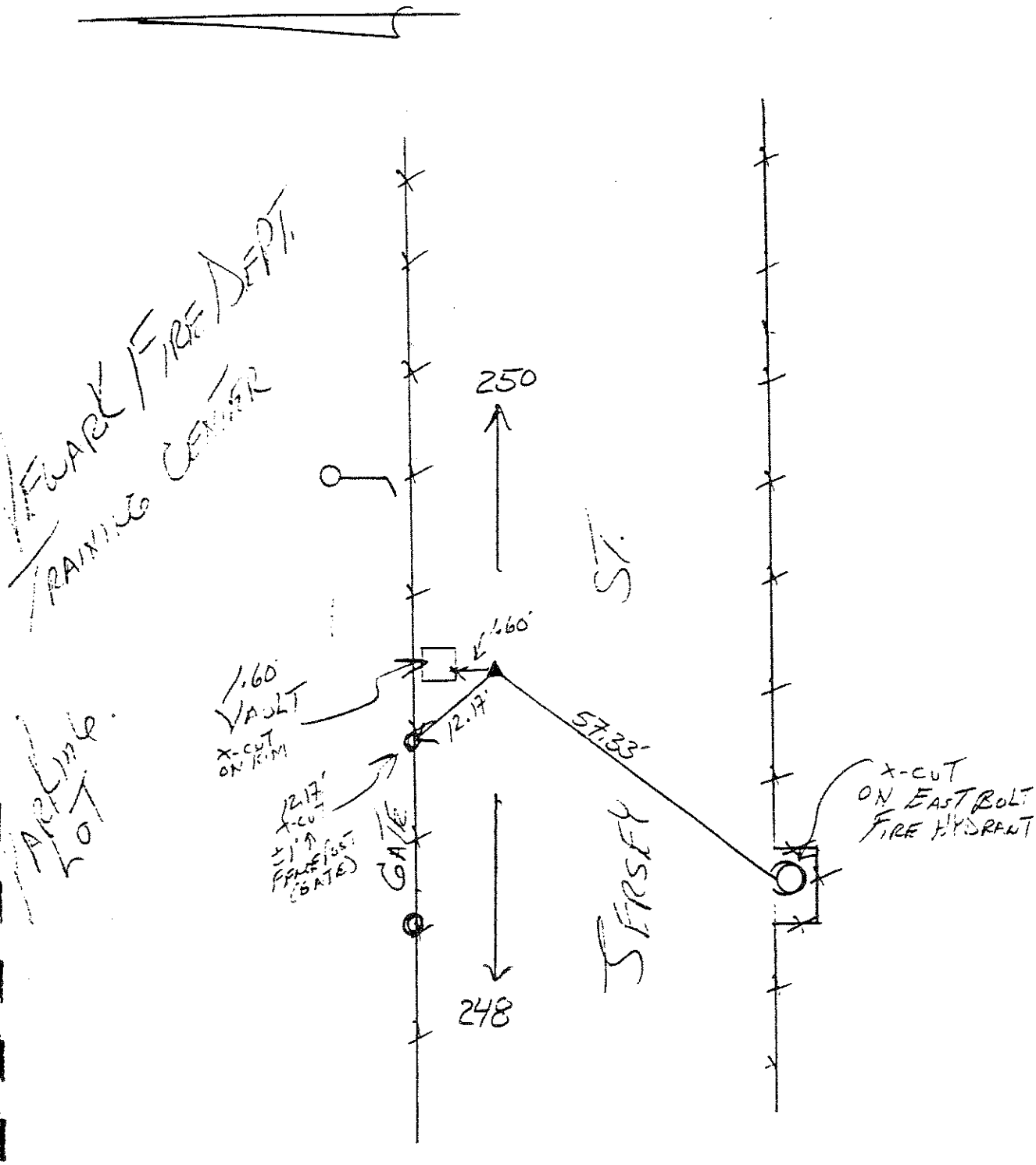
Sheet _____ of _____

Party S.D., A.H. RRD EO, JG, MV Date 9-14-94 Job No. 94-938

Weather 80° P.CLDY Description TIE SKETCH TR 249, PK NAIL



00903-27

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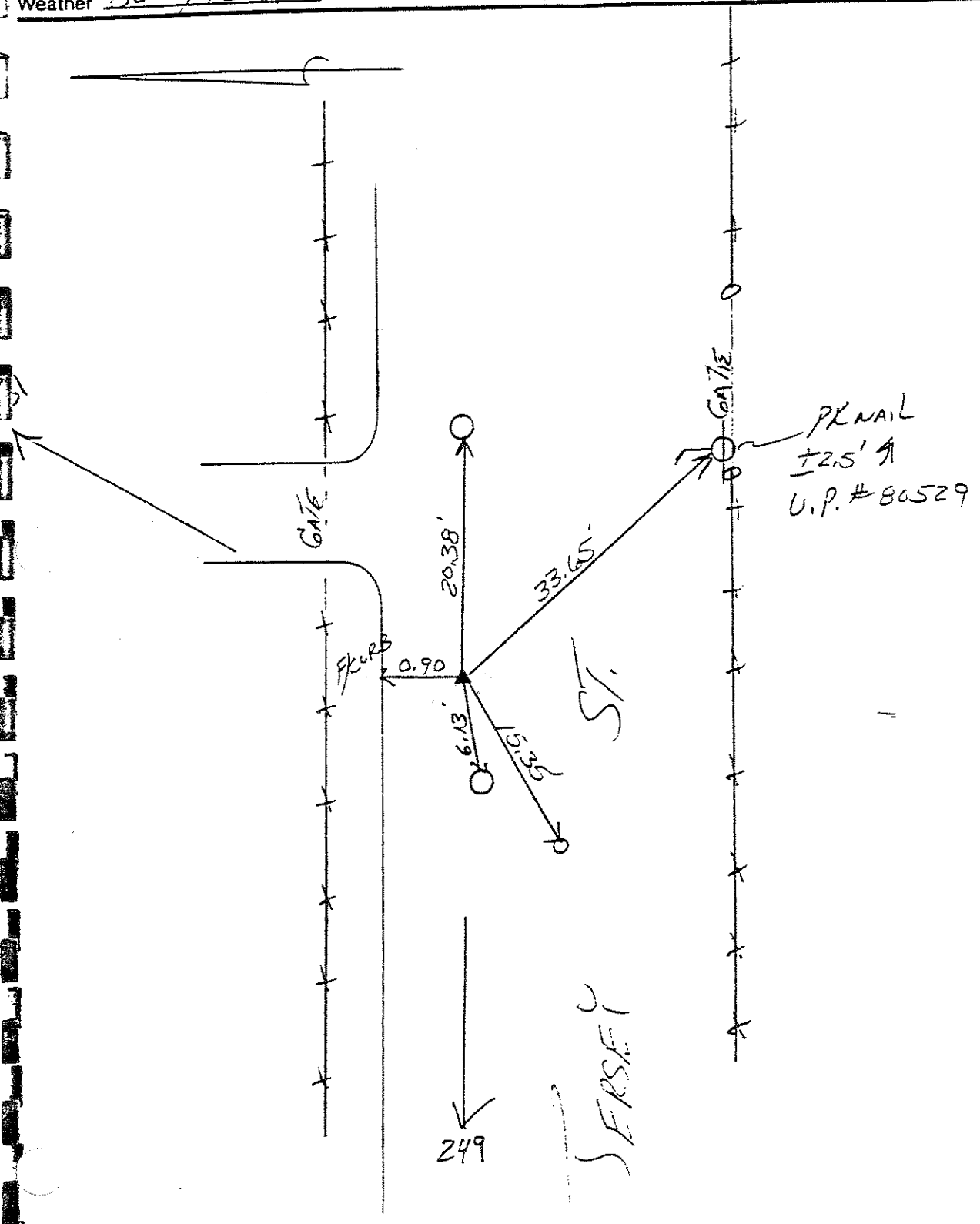
Sheet _____ of _____

Party RRDM, JG, TJ, MV. Date 9-14-94 Job No. 94-93E

Weather 80° P.CLY Description TIE SKETCH, TR 250, PK NAIL



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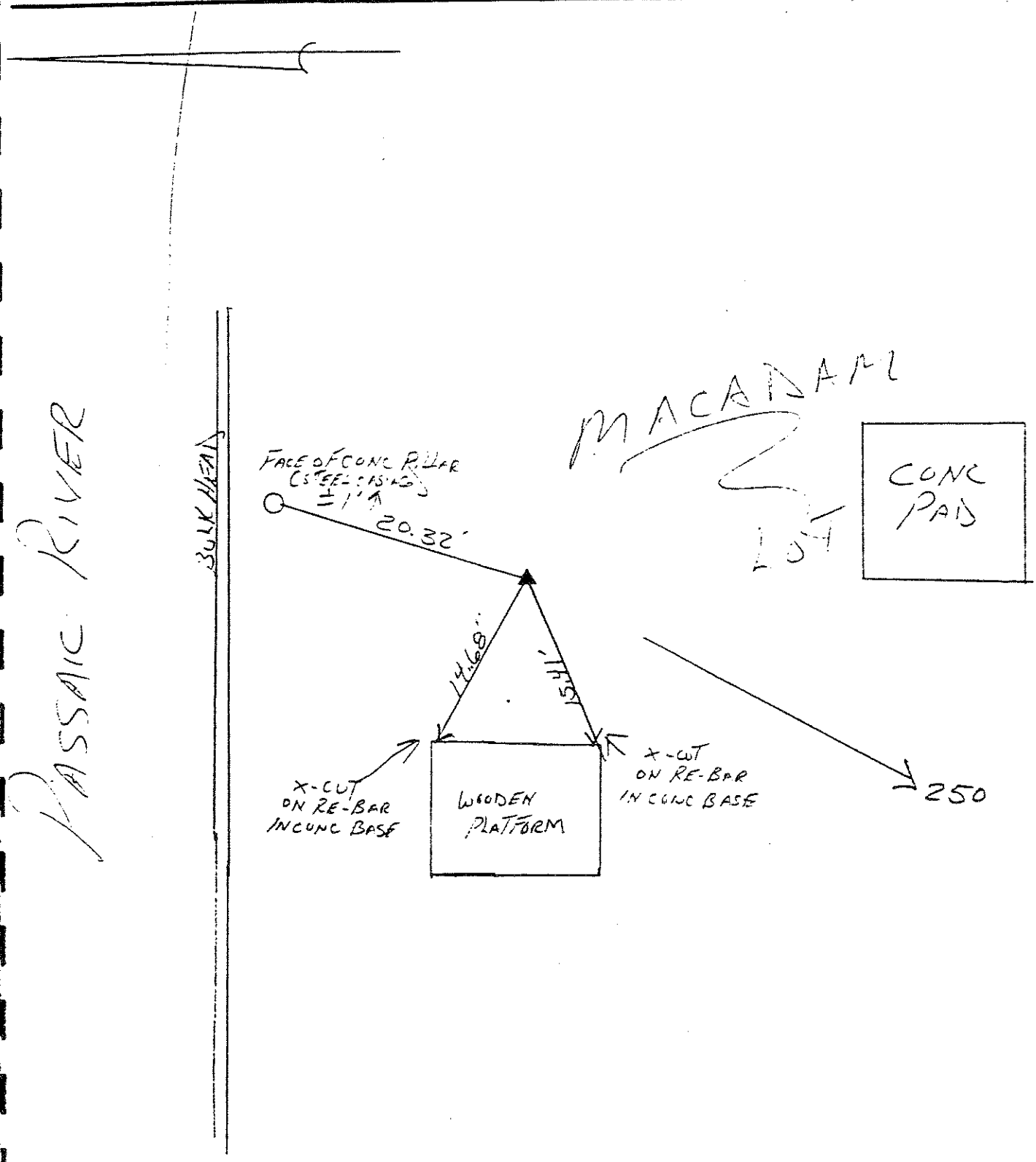
Sheet _____ of _____

Party S.D., AH RRK, J.G., M.V. Date 9-24-94 Job No. 94-938

Weather 80° P. CLDY Description TIE SKETCH TR 251, PK NAIL



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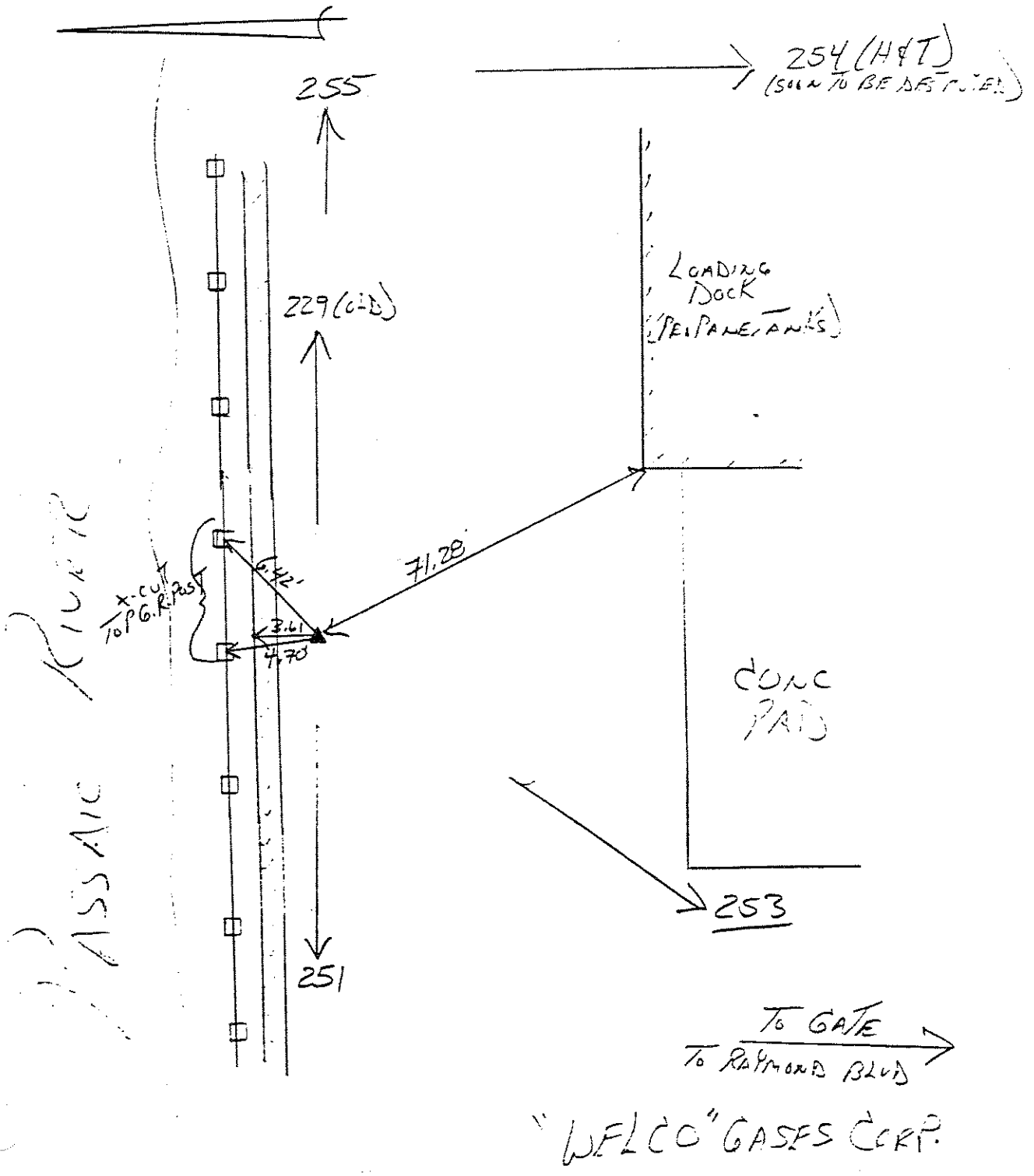
Sheet _____ of _____

Party S.D., A.H. RRD, FW, J.G., M.V. Date 9-14-94 Job No. 94-938

Weather 80° P.CLDY (DRIZZLE) Description TIE SKETCH; TR 252, PK NAIL



"WELCO" GASES CORP.

00903-30

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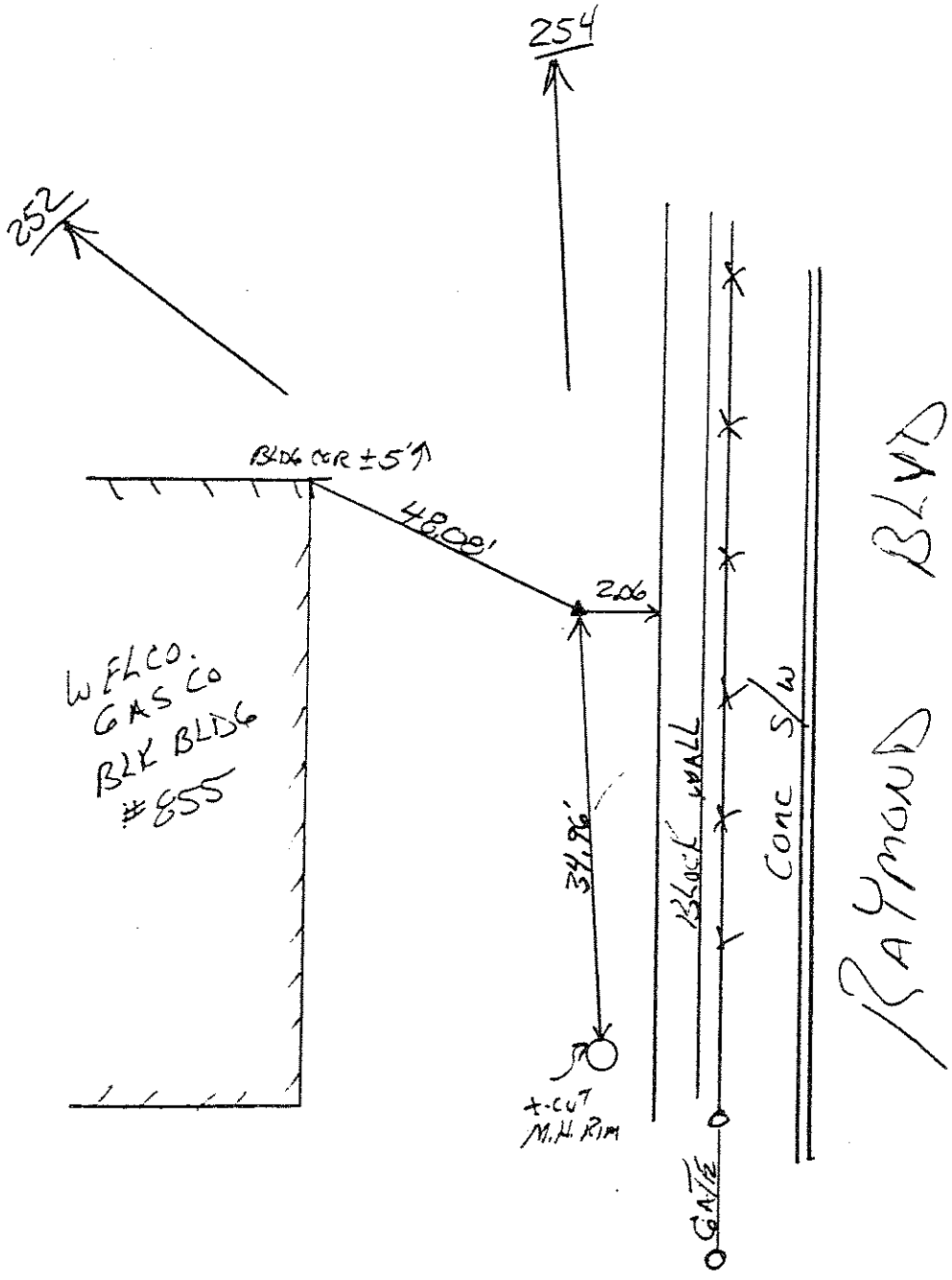
Sheet _____ of _____

Party RRDBA, JGT Date 9-15-94 Job No. 94-938

Weather 80° CLDY Description TIE SKETCH TR 253, PKNAIL



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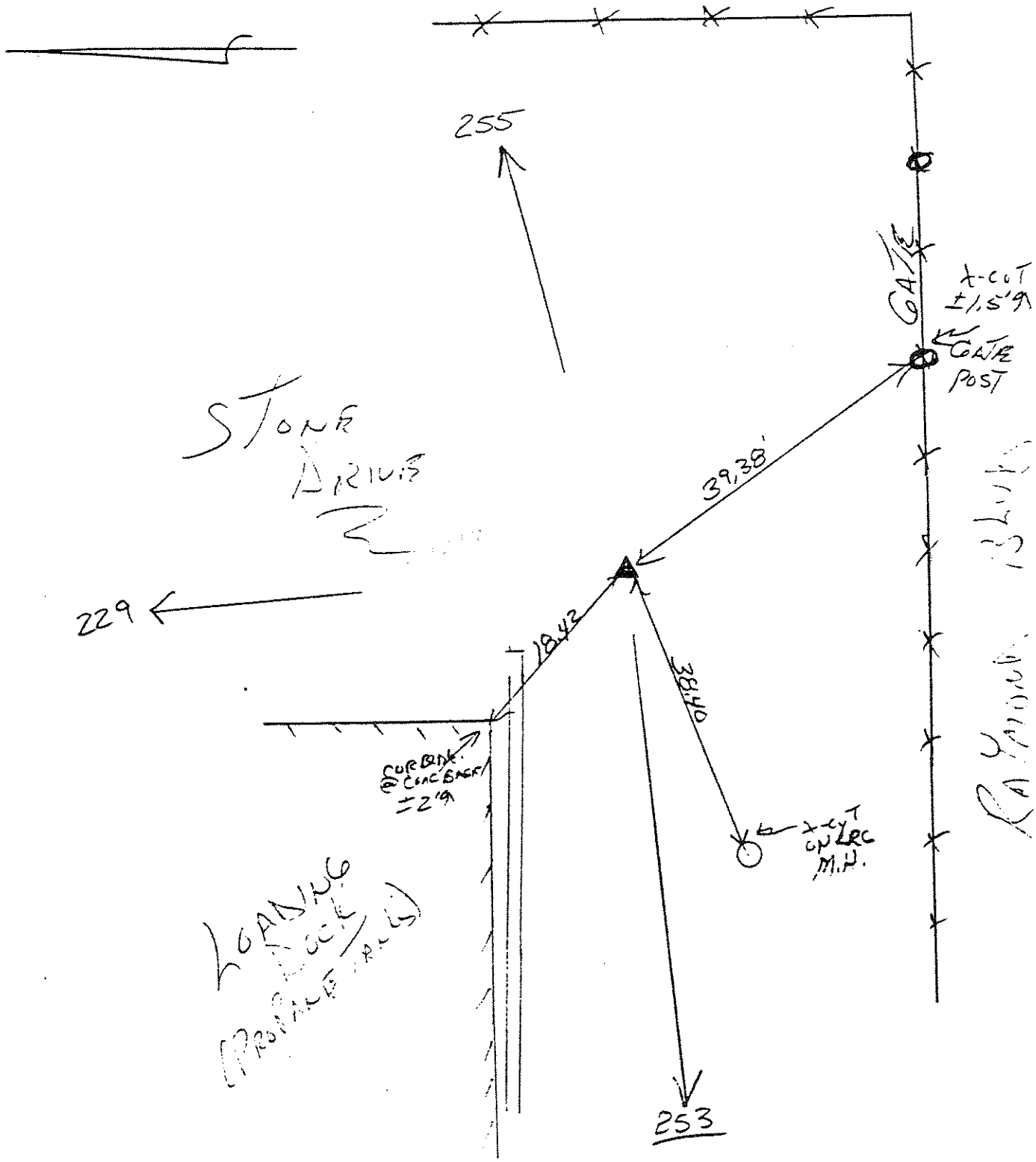
Sheet _____ of _____

RRDEY, J.G.A., M.V. Date 9-14-94 Job No. 94-938

Weather 80° CLDY (DRIZZLE) Description TIE SKETCH: TR 254, HUB & TACK



00903-32

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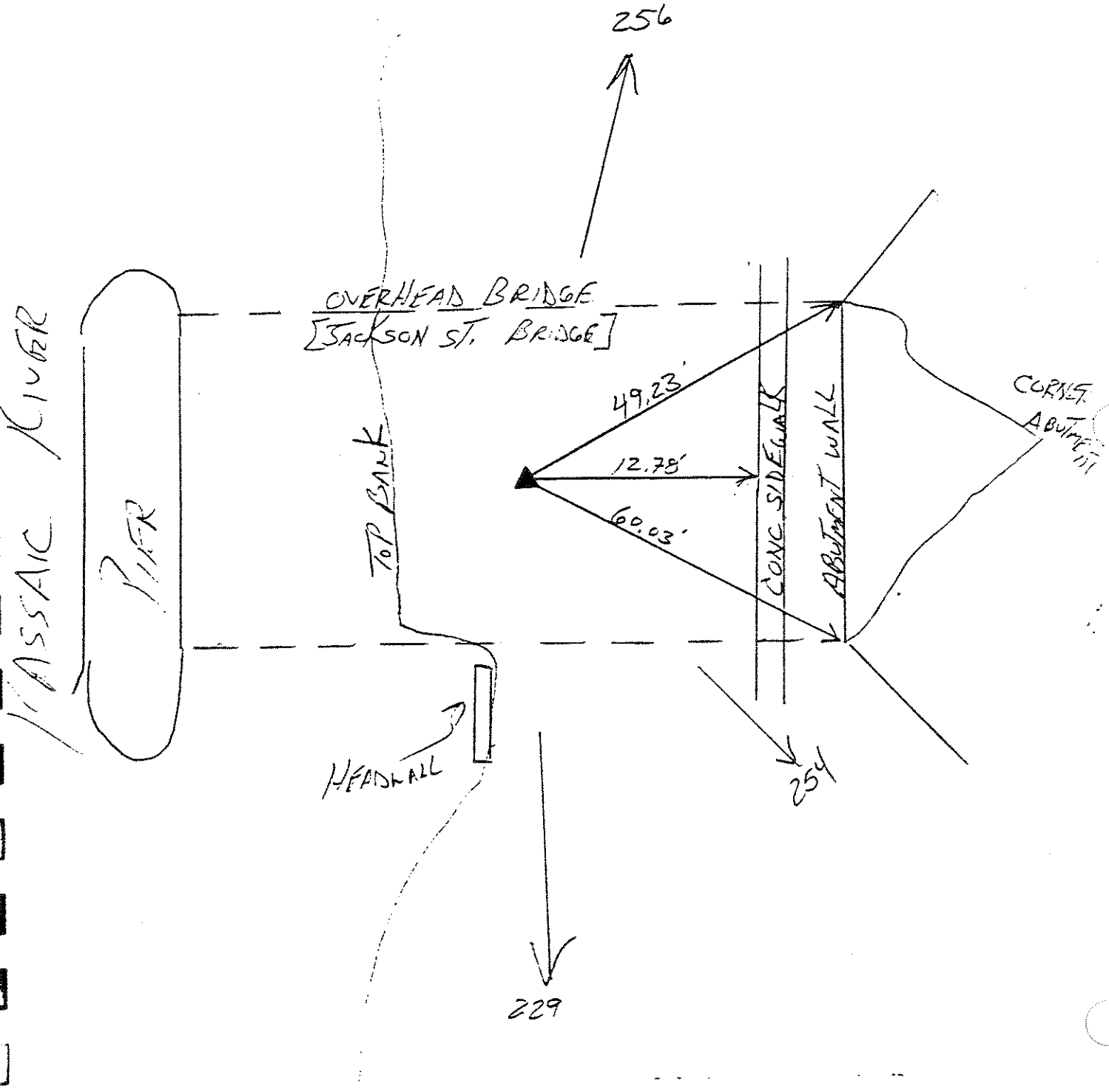
Sheet _____ of _____

Party S.D., A.H RPDM, SGT, M.V.B Date 9-14-94 Job No. 94-938

Weather 80° CLDY (RAIN) Description TIE SKETCH; TR 255, HUB & TACK (SOON TO BE DESTROYED - TRANSFERRED WAY)



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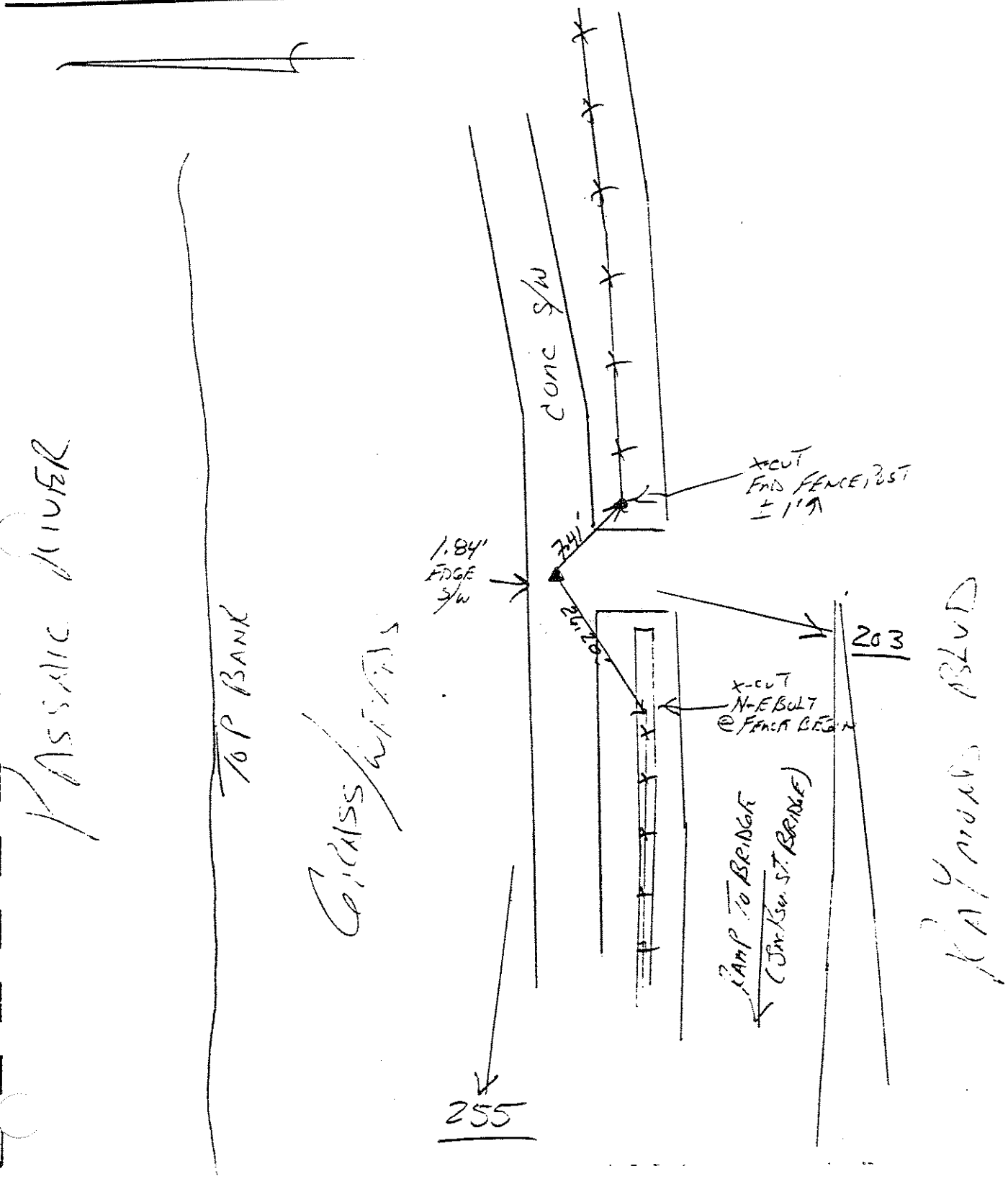
S.D. A.H.
R.R. J.G. M.V.

Date 9-14-94 Job No. 94-938

Weather 80° CLDY

Description TIE SKETCH TP 256, X-CUT IN SIDEWALK



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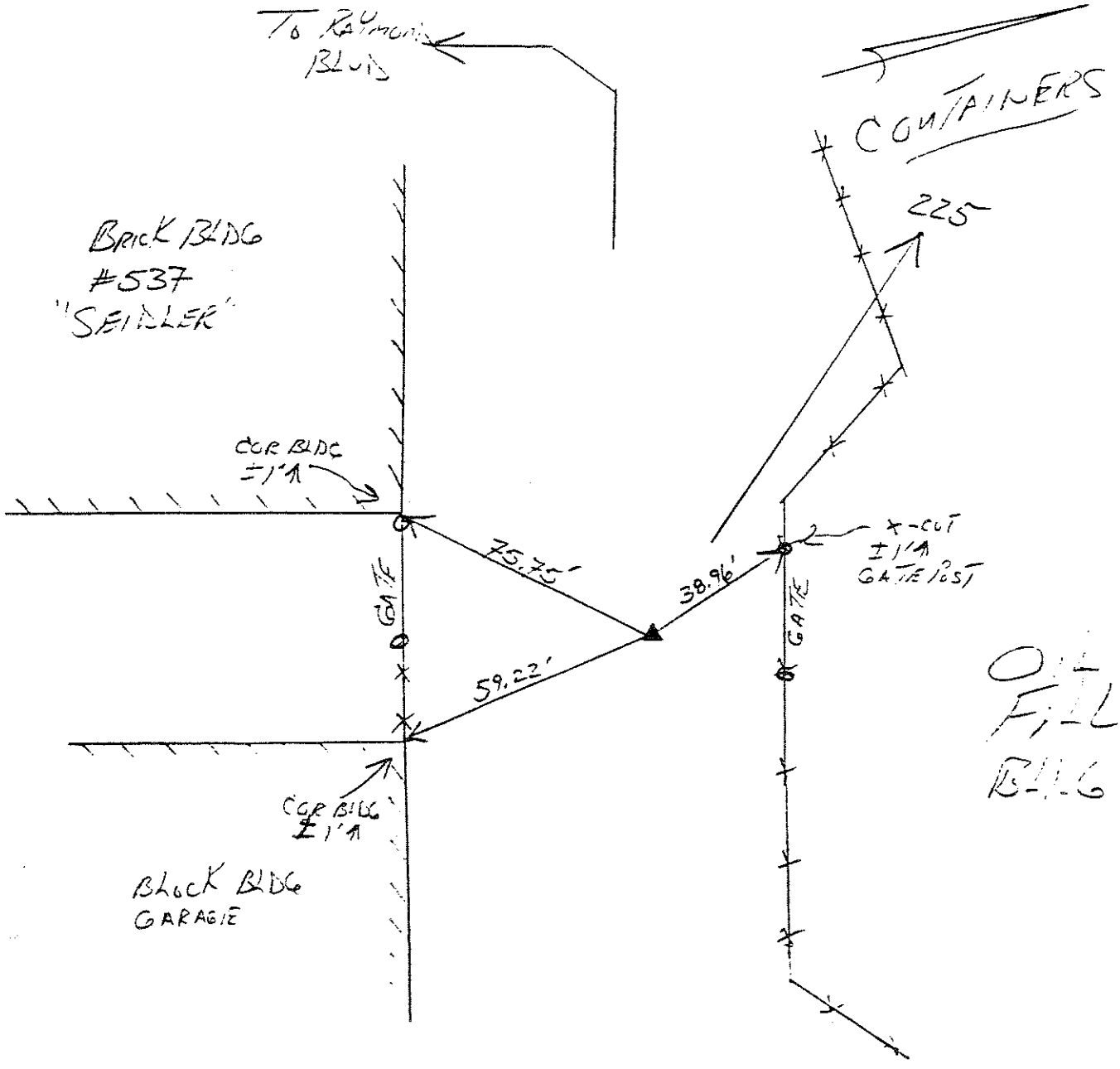
Sheet _____ of _____

Party RRDM, JG Date 9-15-94 Job No. 94-938

Weather 80° CLEAR Description TESKETCH, TR 257, PK NAIL



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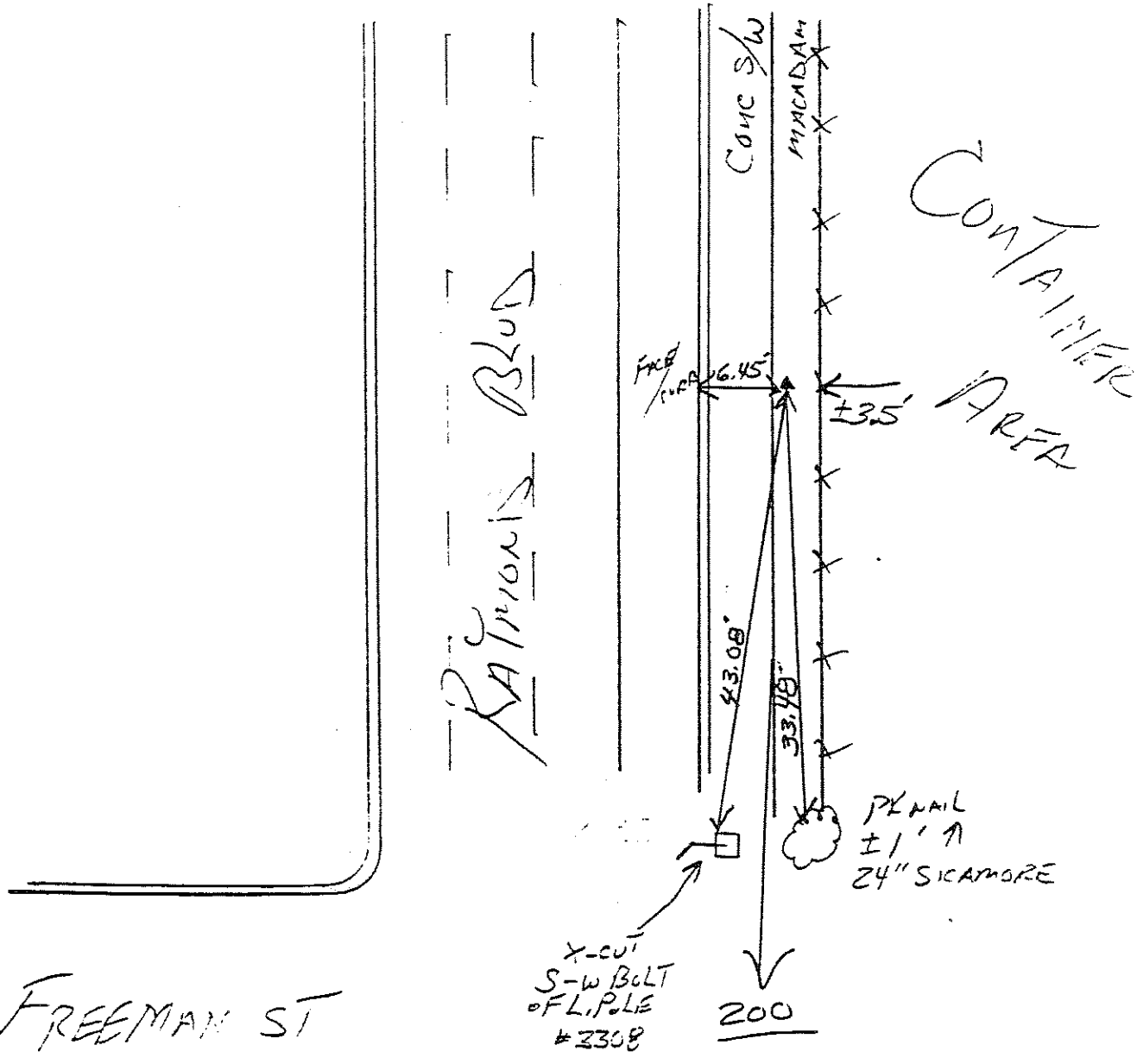
RRD Eng. J.G. Date 9-15-94 Job No. 94-938

Weather 80° P. CLDY Description TIE SKETCH; TR 258, PK NAIL



00903-36

CONTROL REPORT
GEOD JOB 94938

ALPINE
PASSAIC RIVER
NEWARK NJ

PAGE 2 1'=1000 PLOT OF CONTROL.

PAGE 3-4 FINAL 3D CORRDINATES IN U.S. FEET N.J.S.P.C.S. 1983

PAGES 5-28 3D NETWORK ADJUSTMENT.

PAGE 29-32 HORIZONTAL TRAVERSE CLOSURES.

PAGES 33-38 DIFFERENTIAL LEVEL NOTES. N.G.V.D. 1929.

PAGE 39 CORPSCON CONVERSION FOR NJ STATE MONUMENTS.

PAGES 40-43 NJ MONUMENT SHEETS.

PAGE 44 BM-1B FROM D.M.P. VERTICAL CONTROL REPORT.

PAGES T1-T28 TIE SKETCHES.

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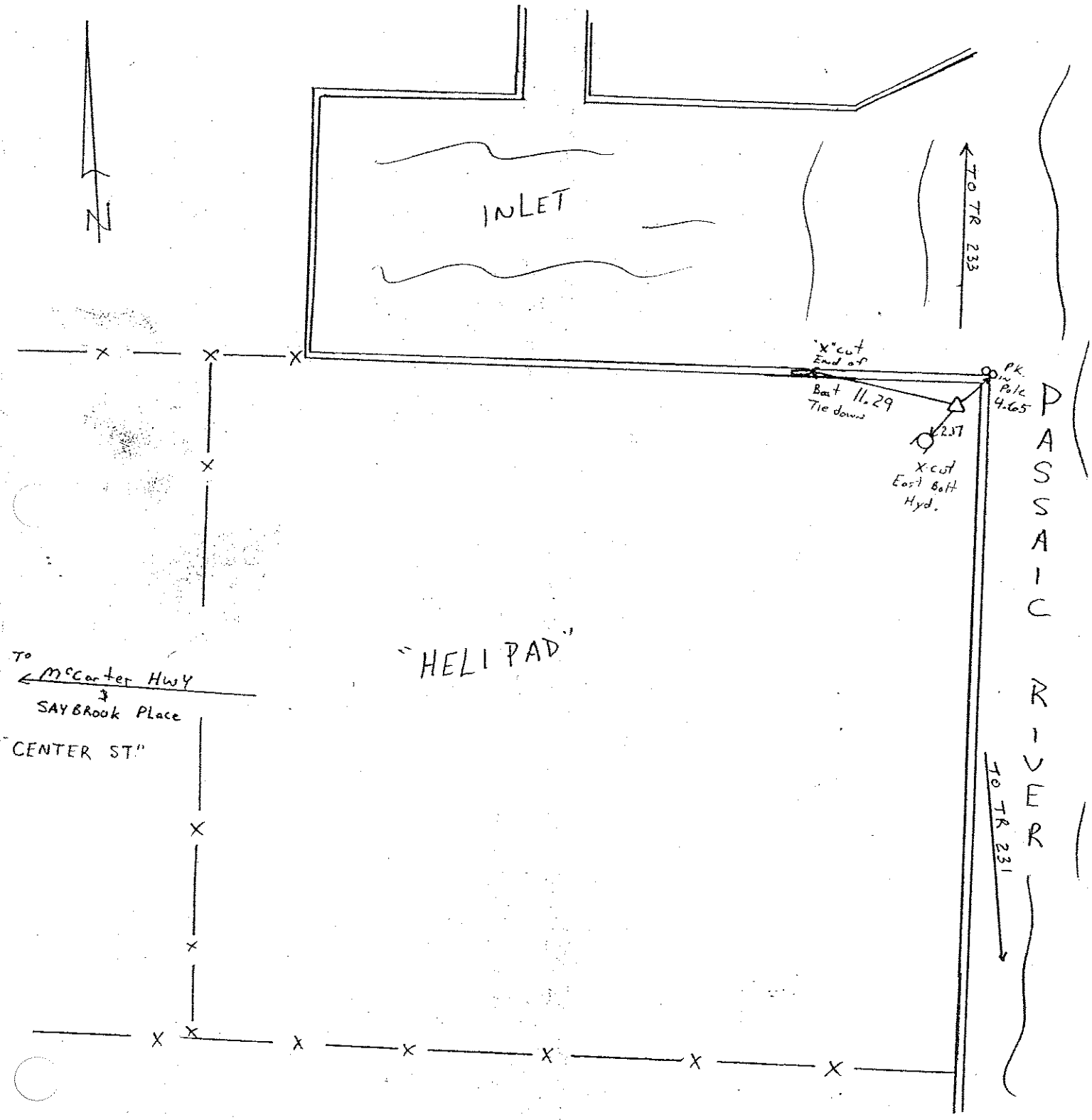
By SWD, AH, AS Date 5 Aug 94 Job No. 94-938

Weather 80° - overcast Description TR 232 - RR spike



00903-38

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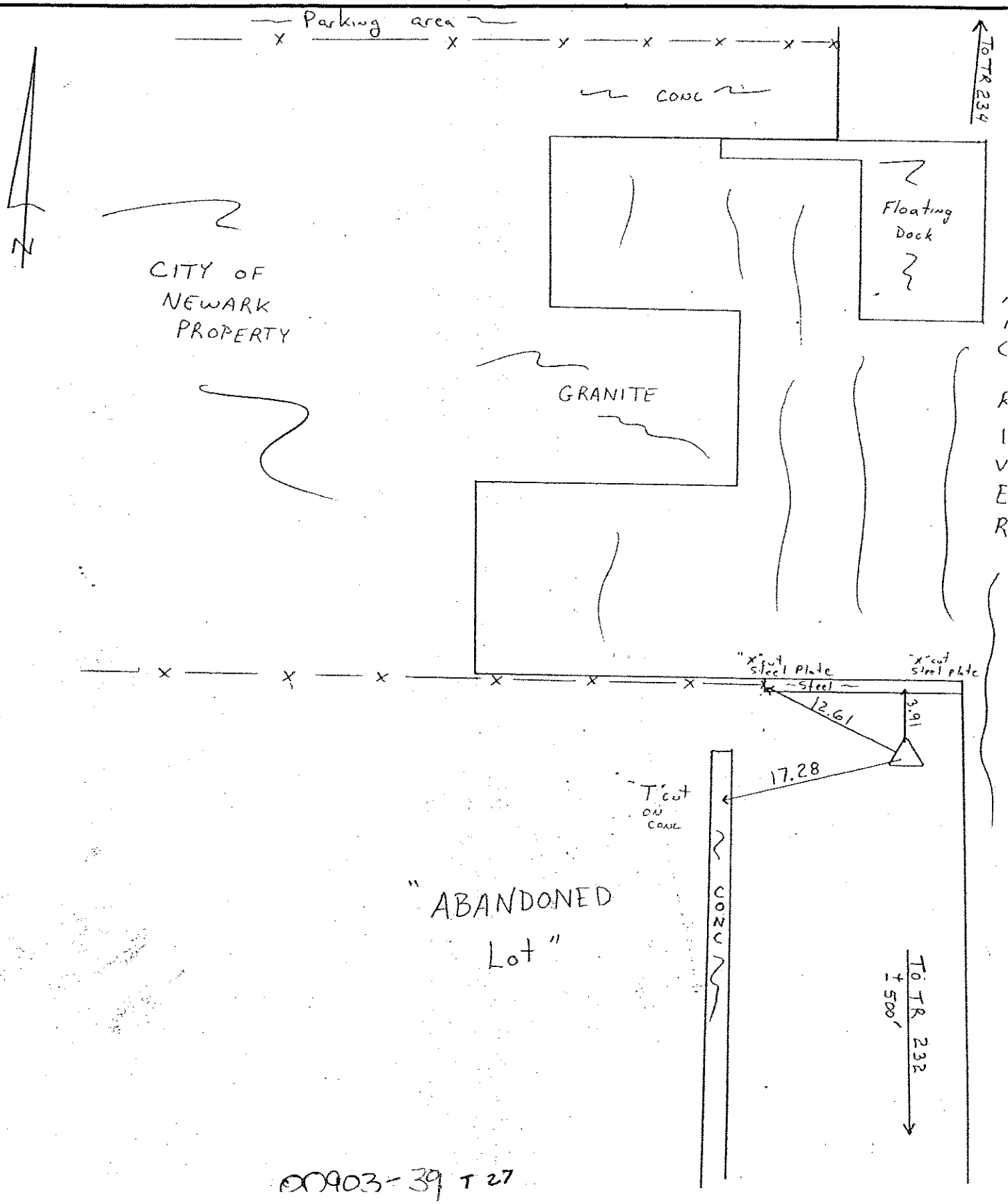
SWD, AH, AS Date 5 Aug 94 Job No. 94-938

Weather 80°-overcast Description TR 233-"X" cut



00903-39 T 27

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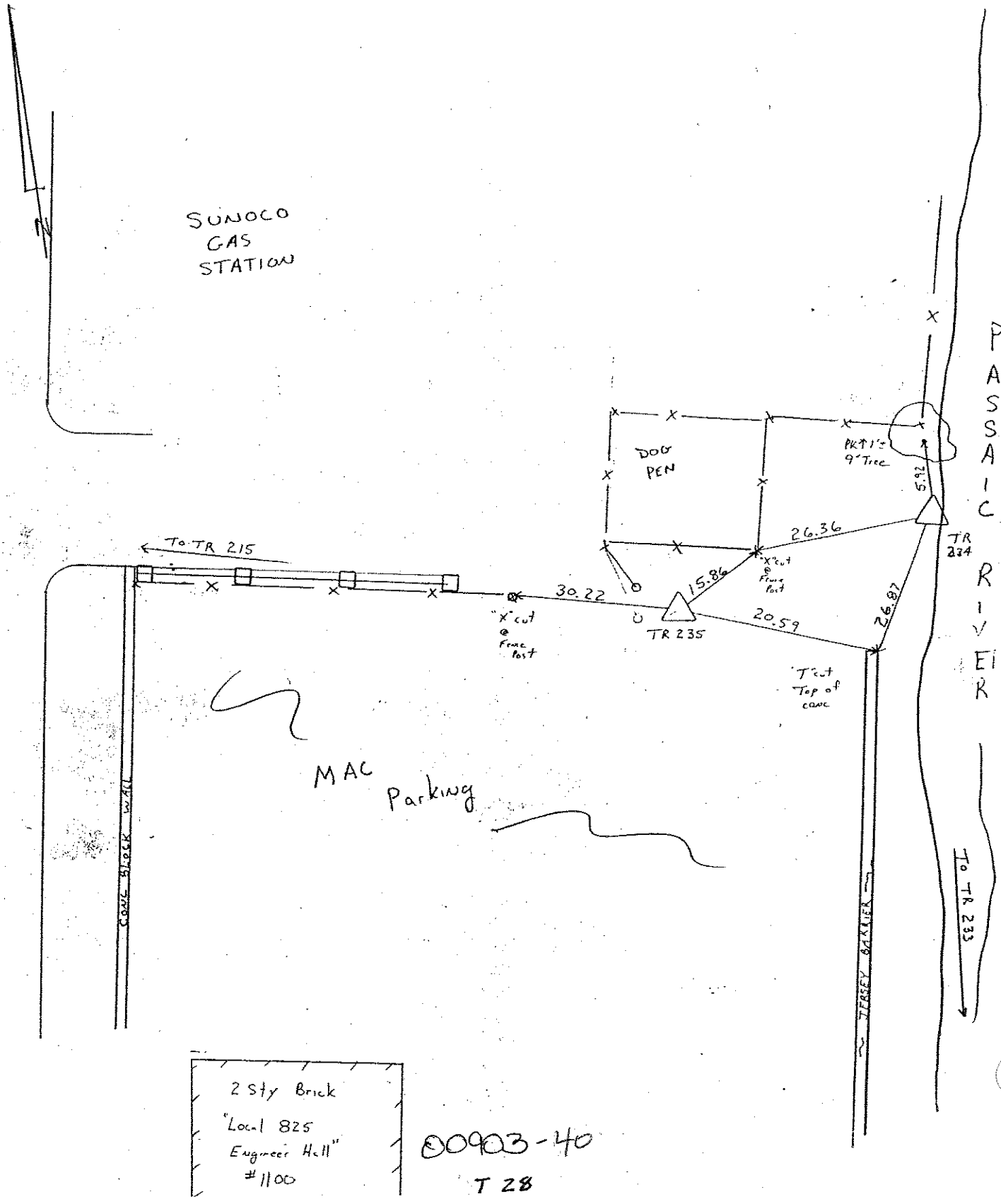
Party SWD, AH, AS Date 5 AUG 94 Job No. 94-938

Weather 80°-overcast Description TR 234 - "REBAR" / TR 235 "PK" Nail



00903-40
T 28

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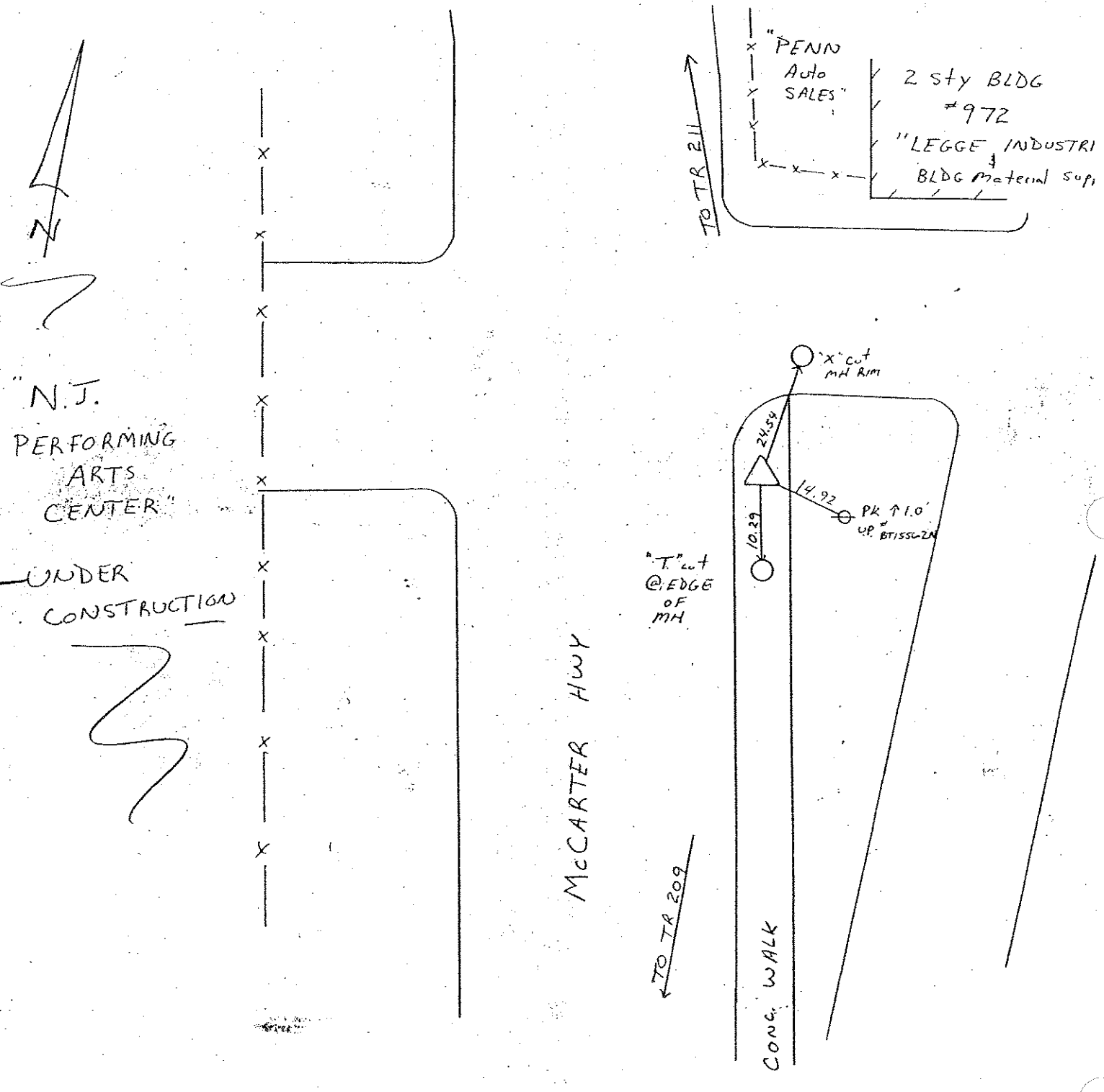
Party SWD, RK, AH Date 7Jul94 Job No. 94-938

Weather 90° cloudy Description TR 210 "X"-cut



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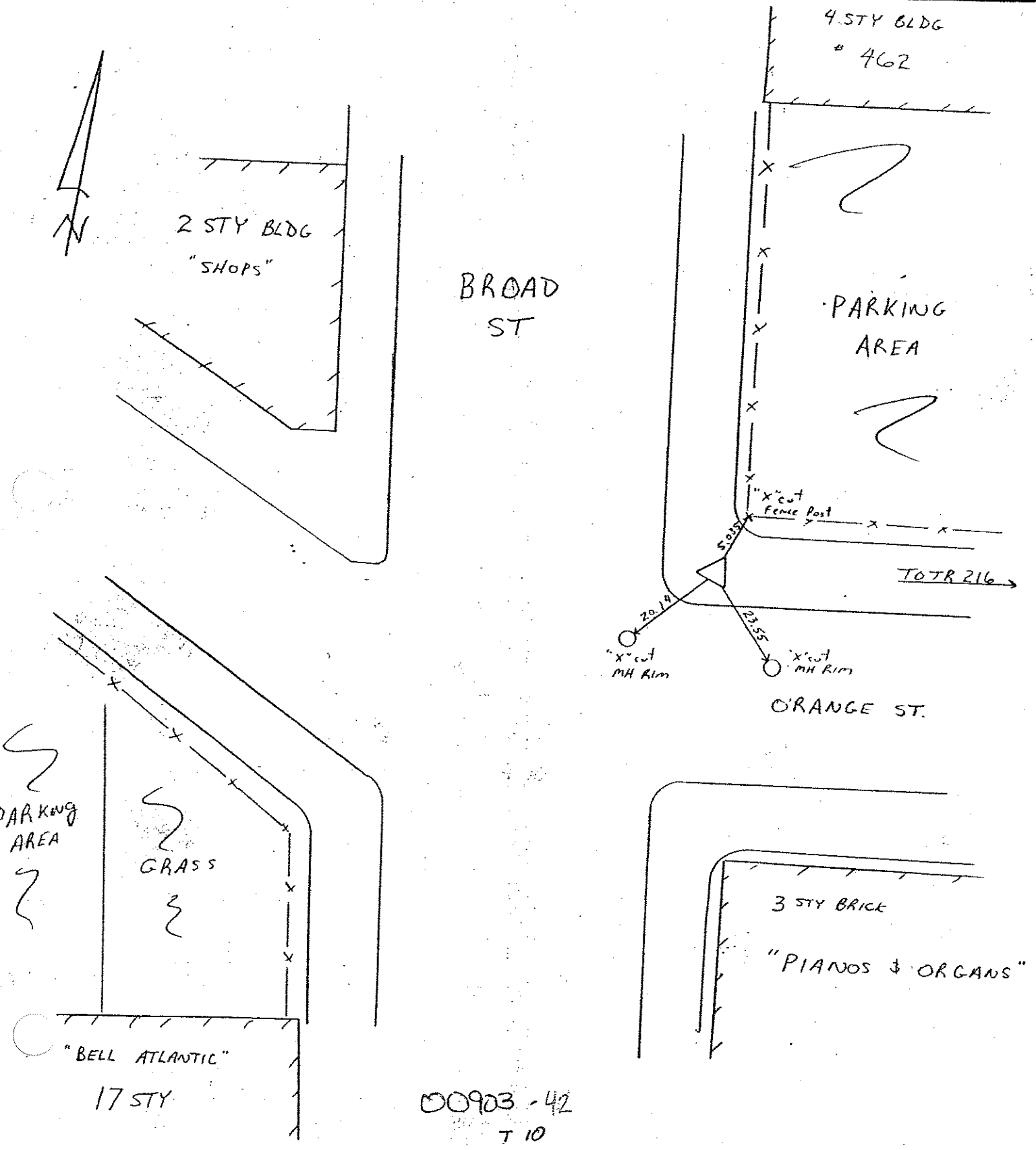
F., SWD, RK, AH Date 7 Jul 94 Job No. 94-938

Weather 95°- Sunny Description TR 217-"X"-cut



00903-42
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SECTION 00904

APPENDIX D - LIST OF ITEMS

LIST OF ITEMS

JOSEPH G. MINISH PASSAIC RIVER WATERFRONT PARK
APPENDIX C - LIST OF ITEMS
NEWARK, NEW JERSEY
CONSTRUCTION CONTRACT NO. 4
STATION 37+10 TO STATION 92+13.59

Item No.	Description
1	Clearing and Grubbing
2	Demolition
3	Removal and Salvage of Historic Building Materials
4a	Trench Excavation 15" dia. RC Pipe
4c	Trench Excavation 36" dia. RC Pipe
4d	Trench Excavation 60" dia. RC Pipe
4f	Trench Excavation 84" dia. RC Pipe
4g	Concrete Removal
4h	Trench Excavation 7'x9' RC Culvert
4i	Trench Excavation 5.5'x8.25' RC Culvert
5	Anchors
6a	Installed Steel Sheet Piling
6b	Pulled Steel Sheet Piling
6c	Redriven Steel Sheet Piling
7	Steel H-Piles
8	Structural Steel
9a	Bedding Material
9b	Select Granular Material
10	Unclassified Excavation
11	Borrow
12	Excavation and Transport of Contaminated Material
13	Treatment and Disposal of Contaminated Material
14	45' Long Concrete Filled Tapered Steel Piles
15	15" dia. RC Pipe
16	Concrete Masonry Construction
17	36" dia. RC Pipe
18	60" dia. RC Pipe
19	Not Used

Item No.	Description
20	84" RCP
21	Inlets
22a	Flap Valves 15" dia.
22c	Flap Valves 36" dia.
22e	Flap Valves 60" dia.
22f	Flap Valves 72" dia.
22h	Flap Valves, 5.5'x8.25'
22i	Flap Valves, 7'x9'
23	Geotextile
24	Riprap
25	Turf
26	Not Used
27a	Plain Deformed Steel Bars
27b	Epoxy Coated Deformed Steel Bars
28	Concrete
29	Bituminous Paving
30	Not Used
31	Subdrain
32	Chain Link Fence
33	Concrete Sidewalks
34	Guide Rail
35	Tree Protection Materials
36	Wetland Subsoil
37	Excavation and Transport of Non-hazardous Material
38	Treatment and Disposal of Non-hazardous Material
39	Aggregate Base Course for Overlook
40	Not Used
41	Separation Geotextile
42	Riprap for Wetland Protection
43	Aggregate for Overlook
44	Construction Fence
45	Herbivory Fence
46	Pipe Rail Fence
47	Lawn Seed Mix
48	Native Grass Seed Mix
49	Upland Topsoil
50	Surface Erosion Control Blanket

Item No.	Description
51	Low Marsh Plants
52	High Marsh Plants
53	Tidal Shrub Marsh Plants
54	Upland Slope Plants
55	Wetland Topsoil
56	Marsh Fertilizer
57	Shrub/Tree Fertilizer
58	Coir Fiber Matting
59	Coir Fiber Log
60	Interpretive Sign Type - A
61	Interpretive Sign Type - B

SECTION 00905

APPENDIX E – PHOTOGRAPHS OF CONSTRUCTION PERFORMED UNDER SEPARATE CONTRACT

MINISH PARK

Contract 2 bulkhead installation using coffer dam

SECTION 01311

PROJECT SCHEDULE: BAR CHART

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-12 Schedules

Initial Project Schedules; G, RO

Revised Project Schedule; G, RO

Periodic Schedule Update; G, RO

SD-14 Progress Curve

Report Format; G, RO

SD-15 Narrative Reports with Schedule Updates

Report Format; G, RO

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

Pursuant to the Contract Clause, SCHEDULES FOR CONSTRUCTION CONTRACTS, and Special Contract Requirements SCHEDULING AND DETERMINATION OF PROGRESS the Contractor shall prepare and submit for approval a practicable project schedule. The schedule will be submitted within five (5) days after receipt of Notice to Proceed or as otherwise determined by the Contracting Officer.

3.2 BASIS FOR PAYMENT

The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.3 PROJECT SCHEDULE

The Project Schedule shall be in the form of a chart consisting of a series of bars graphically indicating the sequence proposed to accomplish each work feature or operation. Each bar will represent a work features, system or series of activities within the construction project. The chart shall be prepared to show the starting and completion dates of all work features on a linear horizontal time scale beginning with date of Notice to Proceed

and indicating calendar days to completion. Interdependence of status of activities shall be shown. Horizontal time scale shall allow identification of the first work day of each week, which shall be identified. Space between bars shall be allowed for future revisions and notations.

3.4 PROGRESS CURVE

With the Project Schedule the Contractor shall also submit for approval a progress curve which reflects the intended schedule for completing the work. The progress curve (S-Curve) will be plotted to reflect Cumulative Progress (Percent) based on placement along the y-axis and Time along the x-axis.

3.5 SCHEDULE AND PROGRESS CURVE UPDATES

Approved Schedule and Progress Curve will be updated monthly during the entire duration of construction. Not later than four days after the Monthly Progress Meeting the Contractor shall submit updated Project Schedule and Progress Curve. The updated versions shall include all approved contract revisions, progress of each activity to date of submission, and adjustments. Contractor shall also provide a very brief narrative report as required to indicate any problem areas, anticipated delays, impact on schedule, and corrective action.

3.6 PERIODIC PROGRESS MEETINGS

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

-- End of Section --

SECTION 01312

QUALITY CONTROL SYSTEM (QCS)

1. GENERAL

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

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

1.1 Correspondence and Electronic Communications

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

1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01311, PROJECT SCHEDULE: BAR CHART, Section 01330, SUBMITTAL PROCEDURES, and Section 01451, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

2. QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

3. SYSTEM REQUIREMENTS

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

Hardware

IBM-compatible PC with 200 MHz Pentium or higher processor

64+ MB RAM

4 GB hard drive disk space for sole use by the QCS system

3 1/2 inch high-density floppy drive

Compact disk (CD) Reader

Color monitor

Laser printer compatible with HP LaserJet III or better, with minimum 4 MB installed memory.

Connection to the Internet, minimum 28 BPS

Software

MS Windows 95 or newer version operating system (MS Windows NT 4.0 or newer is recommended)

Word Processing software - MS Word 97 or newer

Internet browser

The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.

Electronic mail (E-mail) compatible with MS Outlook

4. RELATED INFORMATION

4.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website ("http://winrms.usace.army.mil/);

5. CONTRACT DATABASE

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

6. DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract

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

6.1 Administration

6.1.1 Contractor Information

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

6.1.2 Subcontractor Information

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

6.1.3 Correspondence

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

6.1.4 Equipment

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

6.1.5 Management Reporting

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

6.2 Finances

6.2.1 Pay Activity Data

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

Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. CLINs may include multiple activities, but activities may be assigned to only one such CLIN item. The total of all CLINs equals the Contract Amount.

6.2.2 Payment Requests

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

6.3 Quality Control (QC)

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

6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01451, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the Government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

6.3.2 Deficiency Tracking.

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

6.3.3 Three-Phase Control Meetings

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

6.3.4 Accident/Safety Tracking.

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

6.3.5 Features of Work

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

6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC Testing, Transfer Property Listings, Installed Property Listings, and User Training requirements in QCS, all tied to individual pay activities. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

6.4 Submittal Management

The contractor will initially be required to enter all required submittal information into QCS. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns of ENG Form 4288, as required by Section 01330, SUBMITTAL PROCEDURES. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

6.5 Schedule

The Contractor shall develop a construction schedule consisting of pay activities, in accordance with Contract Clause "Schedules for Construction Contracts", or Section 01311, PROJECT SCHEDULE: BAR CHART, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01311 PROJECT SCHEDULE: BAR CHART). The contractor shall be responsible for ensuring the SDEF is in the format required to upload the data to QCS; otherwise, the contractor will be required to enter the data manually. The updated schedule data shall be included with each pay request submitted by the Contractor.

6.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import Government-provided data.

7. IMPLEMENTATION

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

8. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

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

8.1 File Medium

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

8.2 Disk or CD-ROM Labels

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

8.3 File Names

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

9. WEEKLY SUBMISSION OF EXPORT FILES

The contractor shall, at a minimum, generate and submit weekly export files to the Government.

10. MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions. The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be

returned. The Government will not process progress payments until an acceptable QCS export file is received.

11. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. The QCS module shall be completed to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, and Insurance, as approved by the Contracting Officer).

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

This section covers procedures to be used in making submittals called for in the contract documents. In contracts which contain specific "Contractor Quality Control" requirements, the Contractor's Quality Control Representative shall carry out duties associated with submittal procedures. In contract which do not contain specific CQC requirements, reference to "CQC Representative" shall be interpreted as reference to the Contractor's authorized representative, and references to "CQC Requirements" or "CQC Clauses" shall be interpreted as "requirements or clauses elsewhere in the contract."

1.2 SUBMITTAL IDENTIFICATION

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

SD-01 Preconstruction Submittals

A document, required of the Contractor, or through the Contractor, from a supplier, installer, manufacturer, or other lower tier Contractor, the purpose of which is to confirm the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.

SD-02 Shop Drawings

Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, details of fabrication, layouts of particular elements, connections, and other relational aspects of the work.

SD-03 Product Data

Preprinted manufacturer material describing a product, system, or material, such as catalog cuts.

SD-04 Samples

Samples, including both fabricated and un-fabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

SD-05 Design Data

Submittals, which provide calculations, descriptions, or documentation regarding the work.

SD-06 Test Reports

Reports of inspections or tests, including analysis and interpretation of test results.

SD-07 Certificates

Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system or material, attesting that the product, system or material meets specified requirements. The statement must be dated after the award of the contract, must state the Contractor's name and address, must name the project and location, and must list the specific requirements, which are being certified.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material; including special notices and material safety data sheets, if any, concerning impedances, hazards, and safety precautions.

SD-09 Manufacturer's Field Reports

Daily reports from specially suppliers to the contractor that provide information, data, tests result for a product.

SD-10 Operation and Maintenance Data

Data, which forms a part of an operation and maintenance manual.

SD-11 Closeout Submittals

All data, documentations, information, and drawings to achieve contract closeout.

SD-12 Schedules

All data, documentations, information, and drawings to achieve contract closeout.

SD-13 Records

Documentation to record compliance with technical or administrative requirements.

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Government Approved/Acceptance (G)

Government approval is required for all specification submittal items found in specifications having structural steel connections, extensions of design, Fire Protection/Life Safety, and Commissioning of HVAC, and other items as designated by the Contracting Officer. Government approval/ acceptance (G) is also required for all submittals designated as such in the technical specifications. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings." The Government will review all submittals designated as deviating from the Solicitation or Accepted Proposal, as described below.

1.3.2 Information Only (FIO)

All Contractor submittals not requiring Government approval/acceptance will be for information only. FIO submittals are identified in the approved submittal register. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above. FIO Submittals will be retained at the project site and reviewed prior to Preparatory Meetings in accordance with CEGS-01451, CONTRACTOR QUALITY CONTROL.

1.3.3 Government Approval/Acceptance (G)

All submittals classified for Government Approval/Acceptance (G) are identified in the approved submittal register Form 4288. A code following the "G" designation indicates the approving authority; codes of "RO" for Resident Office approval, "DO" for NYD Engineering Division approval, and "AE" for Architect-Engineer approval.

1.4 APPROVED/ACCEPTANCE SUBMITTALS

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

1.5 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.

1.6 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) System Manager and each item shall be stamped, signed, and dated by the Contractor's Quality Control CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288)

At the end of this section is one set of ENG Form 3288 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. Columns "d" through "r" have been completed by the Government; the Contractor shall complete columns "a" "b" and "s" through "aa" and submit the forms (hard copy plus associated electronic file) to the Contracting Officer for approval within 30 calendar days after Notice to Proceed (15 days if construction time is 180 days or less). If the Quality Control System (QCS) Module is required to be utilized on this contract as required by Spec. Section 01312 Quality Control System, then the contractor will be required to process and update the 4288 electronically, and make appropriate electronic submissions to the Government. Otherwise, the Contractor shall enter the submittal register in an appropriate electronic format such as MS Excel, manually. In both cases, the Contractor shall update the 4288 electronically, 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. NOTE: The Contractor is required to add additional entries to the Submittal Register for all items requiring multiple submittals, including Formwork Shop Drawings per Lift, Concrete Reinforcement per Lift, Concrete Lift Drawings per Lift, Multiple Shop Assembly Drawings, etc. These entries should be made prior to original submission of the submittal register within 30 days of Notice to Proceed.

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. An additional 10 calendar days shall be allowed and shown on the register for review and approval of submittals for food service equipment, refrigeration and HVAC control systems, computer software for specialty systems, electrical substations, and studies including electrical system coordination studies.

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/accepted 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.

If the contractor is required in another section of the specifications to utilize the Quality Control System (QCS), the contractor will be required to generate and process this form electronically using the QCS System.

3.5 SUBMITTAL PROCEDURE

Submittals shall be made as follows:

3.5.1 Procedures

At the Quality Control Coordination meeting, or preconstruction conference, the Contractor shall ascertain the name and address of each individual, agency, or firm who is designated to normally receive items for approval, for information or samples. The contractor shall complete ENG Form 4025, entering each item requiring a separate approval action as a separate item on the form, for each transmittal. A transmittal may consist of one or more 4025 sheets. The transmittal, consisting of ENG Form 4025 plus all applicable submittals, is then sent to the appropriate individual. On critical items the Contractor is encouraged to confirm receipt via telephone. The Contractor shall submit seven copies of submittals for approval and one for items for information.

3.5.2 Deviations

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

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/accepteance by being so stamped and dated. Four copies of the submittal will be retained by the Contracting Officer and three 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: _____

-- End of Section --

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		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

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-R 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.

B -- Approved, except as noted on drawings.

C -- Approved, except as noted on drawings. Refer to attached sheet resubmission required.

D -- Will be returned by separate correspondence.

E -- Disapproved (See attached).

F -- Receipt acknowledged.

FX -- Receipt acknowledged, does not comply as noted with contract requirements.

G -- Other *(Specify)*

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

(Reverse of ENG Form 4025-R)

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							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01311	Initial Project Schedules		G	RO												
			Revised Project Schedule		G	RO												
			Periodic Schedule Update		G	RO												
			Report Format		G	RO												
			Report Format		G	RO												
		01351	SD-01 Preconstruction Submittals															
			Site Safety and Health Plan		G	RO												
			Exposure Monitoring/Air Sampling		G	RO												
			Program															
			SD-02 Shop Drawings															
			Work Zones	1.19.1	G	RO												
			Decontamination Facilities	1.20.1	G	RO												
			Decontamination Facilities	1.21.1	G	RO												
			SD-06 Test Reports															
			Monitoring/Sampling Results		G	RO												
			Site Control Log	1.19.2	G	RO												
		01410	SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.3	G	RO												
			SD-03 Product Data															
			Tree Protection Materials	2.1.1	G	RO												
		01451	SD-01 Preconstruction Submittals															
			Contractor Quality Plan (CQC)		G	RO												
		01453	SD-11 Closeout Submittals															
			Warranty Plan		G	RO												
		02218	SD-01 Preconstruction Submittals															
			Qualifications of Surveyor		G	RO												

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02218	Monitoring Existing Structures for		G	RO												
			Movement															
			Monitoring of Existing Structures		FIO													
		02220	SD-01 Preconstruction Submittals															
			Work Plan		G	RO												
		02222	SD-06 Test Reports															
			Field Density Tests	3.3.3	G	RO												
			Testing of Backfill Materials	3.3.2	G	RO												
		02233	SD-03 Product Data															
			Graded-crushed Aggregate Base	2.1.1	G	RO												
			Course															
			Equipment	1.5	G	RO												
			SD-06 Test Reports															
			Sampling and Testing	1.7	G	RO												
			Waybills and Delivery Tickets		FIO													
		02275	SD-01 Preconstruction Submittals															
			Floating turbidity barrier	2.1.1	G	RO												
		02300A	SD-01 Preconstruction Submittals															
			Bathymetric and Topographic		G	RO												
			Survey															
			Wetland Subsoil	2.2	G	RO												
			SD-06 Test Reports															
			Testing	3.11	G	RO												
			SD-07 Certificates															
			Testing	3.11	FIO													
			SD-04 Samples															

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02300A	Wetland Subsoil	2.2	G RO												
		02320	SD-03 Product Data														
			Silt Fence	2.1	G RO												
		02378A	SD-03 Product Data														
			Separation Geotextile	2.1	G RO												
			SD-04 Samples														
			Separation Geotextile	2.1	G RO												
			SD-06 Test Reports														
			Testing	3.5	G RO												
			SD-07 Certificates														
			Separation Geotextile	2.1	G RO												
		02380A	SD-03 Product Data														
			Riprap		G RO												
			Riprap for Wetland Protection		G RO												
			SD-04 Samples														
			Riprap		FIO												
			Riprap for Wetland Protection		FIO												
			SD-06 Test Reports														
			Gradation Testing	3.4.4	FIO												
			Evaluation Testing	3.4.3	FIO												
			SD-07 Certificates														
			Riprap		G RO												
			Riprap for Wetland Protection		G RO												
			Laboratory	3.4.3	FIO												
		02390	SD-01 Preconstruction Submittals														
			Equipment		G RO												
			Materials		G RO												
			Work Plan		G RO												

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02390	Procedures		FIO													
			Setups		FIO													
			SD-07 Certificates															
			Materials		FIO													
			Equipment		FIO													
			Documentation		FIO													
		02456A	SD-03 Product Data															
			Equipment	2.2	G RO													
			SD-07 Certificates															
			Materials	2.1	FIO													
			Pile Driving	3.1.1	G RO													
		02462	SD-02 Shop Drawings															
			Pile Splices	2.2.1	G DO													
			Pile Placement	3.2.3	G DO													
			Pile Driving Records	3.2.2	G DO													
			SD-03 Product Data															
			Tapered Steel Piles		G DO													
			Pile Driving Equipment	3.1	G DO													
			Pile Driving Records	3.2.2	G DO													
			Delivery, Storage, and Handling	1.4	G RO													
			Pile Tests		G DO													
			SD-06 Test Reports															
			Pile Driving Tests	3.3.2	G DO													
			Pile Driving Analyzer		G DO													
			Pile Load Tests	3.3.3	G DO													
			SD-07 Certificates															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02462	Tapered Steel Piles		G	DO												
			SD-08 Manufacturer's Instructions															
			Tapered Steel Piles		G	DO												
			As-Built Drawings		FIO													
		02463A	SD-01 Preconstruction Submittals															
			Pile Driving Equipment		G	RO												
			Pulling and Redriving		G	RO												
			SD-02 Shop Drawings															
			Steel Sheet Piling	2.1	G	DO												
			SD-06 Test Reports															
			Interlocked Joint Strength in		G	RO												
			Tension Test															
			Materials Tests		FIO													
			Driving		FIO													
		02551	SD-06 Test Reports															
			Bituminous Paving Mixture		G	RO												
			Waybills and Delivery Tickets		FIO													
		02620a	SD-07 Certificates															
			Filter Fabric	2.2	G	RO												
			Pipe for Subdrains	2.1	G	RO												
		02630	SD-04 Drawings															
			Detail drawings for Flap Valves	2.3.5	G	RO												
			SD-06 Test Reports															
			Placing Pipe		G	RO												
			SD-07 Certificates															
			Determination of Density	3.6.5	G	RO												
			Frame and Cover for Gratings		G	RO												
		02731	SD-03 Product Data															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02731	Aggregate Surface Course	2.1	G	RO												
			Equipment	1.6	G	RO												
			SD-06 Test Reports															
			Sampling and Testing	3.1	G	RO												
		02748A	SD-06 Test Reports															
			Tests		FIO													
			Waybills and Delivery Tickets		G	RO												
		02763A	SD-03 Product Data															
			Equipment	1.4	G	RO												
			Composition Requirements	2.2.1	G	RO												
			Qualifications		G	RO												
			SD-06 Test Reports															
			Sampling and Testing	2.6	FIO													
			SD-07 Certificates															
			Volatile Organic Compound	2.2.3	FIO													
			(VOC)															
		02770A	SD-03 Product Data															
			Concrete	2.1	FIO													
			SD-06 Test Reports															
			Field Quality Control	3.7	G	RO												
		02821	SD-03 Product Data															
			Construction Fence	2.1	G	RO												
			Herbivory Fence	2.2	G	RO												
		02831	SD-07 Certificates															
			Chain Link Fence		G	RO												
		02870	SD-02 Shop Drawings															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02870	Pipe Rail Fence	2.1.1	G	RO												
			Pipe Rail Fence	3.4.1	G	RO												
			SD-03 Product Data															
			Pipe Rail Fence	2.1.1	G	RO												
			Pipe Rail Fence	3.4.1	G	RO												
			SD-04 Samples															
			Pipe Rail Fence	2.1.1	G	RO												
			Pipe Rail Fence	3.4.1	G	RO												
			SD-06 Test Reports															
			Pipe Rail Fence	2.1.1	FIO													
			Pipe Rail Fence	3.4.1	FIO													
			PVC Powdercoating	3.4.2	G	RO												
			TGIC-Polyester Powdercoating	3.4.3	G	RO												
			SD-07 Certificates															
			Testing Laboratory Qualifications	3.4.3	FIO													
			Pipe Rail Fence	2.1.1	FIO													
			Pipe Rail Fence	3.4.1	FIO													
		02921A	SD-03 Product Data															
			Delivery Schedule	1.4.1	G	RO												
			Seed	2.1	G	RO												
			Upland Topsoil	2.2	G	RO												
			pH Adjusters	2.3.1	G	RO												
			Fertilizer	2.3.2	G	RO												
			Organic Material	2.3.3	G	RO												
			Soil Conditioner	2.3.4	G	RO												
			Mulch	2.4	G	RO												

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02921A	Surface Erosion Control Blanket	2.6	G	RO												
			Equipment	3.1	G	RO												
			Equipment	3.1.5	G	RO												
			Finished Grade and Upland	3.1.4	G	RO												
			Topsoil															
			Quantity Check	3.6	FIO													
			SD-04 Samples															
			Upland Topsoil	2.2	G	RO												
			Soil Amendments	2.3	G	RO												
			Mulch	2.4	G	RO												
			Surface Erosion Control Blanket	2.6	G	RO												
			SD-06 Test Reports															
			Equipment	3.1	G	RO												
			Equipment	3.1.5	G	RO												
			Germination and Purity Test for	3.2.1	G	RO												
			Seed															
			Soils Test	3.2.2	G	RO												
			Soil Amendments	2.3	G	RO												
			SD-07 Certificates															
			One-year Plant Guarantee -	3.10	G	RO												
			Seeding															
			Testing Laboratory Qualifications	3.2.2	G	RO												
		02930	SD-03 Product Data															
			Plant Material Order	2.1	G	RO												
			Low Marsh Plants	2.1.1	G	RO												
			High Marsh Plants	2.1.1	G	RO												

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02930	Tidal Shrub Marsh Plants	2.1.1	G	RO												
			Upland Slope Plants	2.1.1	G	RO												
			Wetland Topsoil	2.2	G	RO												
			pH Adjusters	2.3.1	G	RO												
			Organic Material	2.3.2	G	RO												
			Soil Conditioner	2.3.3	G	RO												
			Marsh Fertilizer	2.4.1	G	RO												
			Shrub/Tree Fertilizer	2.4.2	G	RO												
			Delivery Schedule	3.1.1	G	RO												
			Equipment	3.2	G	RO												
			Equipment	3.2.5	G	RO												
			Finished Grade and Wetland	3.2.4	G	RO												
			Topsoil															
			SD-04 Samples															
			Wetland Topsoil	2.2	G	RO												
			Soil Amendments	2.3	G	RO												
			SD-06 Test Reports															
			Equipment	3.2	G	RO												
			Equipment	3.2.5	G	RO												
			Soils Test	3.2.6.1	G	RO												
			Soil Amendments	2.3	G	RO												
			SD-07 Certificates															
			One-year Plant Guarantee	1.5	G	RO												
			Testing Laboratory Qualifications	3.2.6.1	G	RO												
			SD-11 Closeout Submittals															
			As-Planted Plan		FIO													

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02940	SD-03 Product Data															
			Coir Fiber Matting	2.1	G	RO												
			Finished Grade	3.1	G	RO												
			SD-04 Samples															
			Coir Fiber Matting	2.1	G	RO												
		02941	SD-03 Product Data															
			Coir Fiber Log	2.1	G	RO												
			Finished Grade	3.1	G	RO												
			SD-04 Samples															
			Coir Fiber Log	2.1	G	RO												
		03100A	SD-02 Shop Drawings															
			Concrete Formwork		FIO													
			SD-03 Product Data															
			Concrete Formwork		FIO													
			SD-04 Samples															
			Fiber Voids		FIO													
			SD-05 Design Data															
			Design	1.4	FIO													
			SD-07 Certificates															
			Fiber Voids		FIO													
			SD-08 Manufacturer's Instructions															
			Form Releasing Agents	2.1.5	FIO													
		03150A	SD-02 Shop Drawings															
			Waterstops	2.3	G	RO												
			SD-03 Product Data															
			Preformed Expansion Joint Filler	2.1	G	RO												

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CONTRACT NO.

TITLE AND LOCATION
MINISH CONTRACT NO. 4

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03150A	Sealant	2.2	G	RO												
			Waterstops	2.3	G	RO												
			SD-07 Certificates															
			Preformed Expansion Joint Filler	2.1	G	RO												
			Sealant	2.2	G	RO												
			Waterstops	2.3	G	RO												
			SD-08 Manufacturer's Instructions															
			Preformed Expansion Joint Filler	2.1	G	RO												
			Sealant	2.2	G	RO												
			Waterstops	2.3	G	RO												
		03200A	SD-01 Preconstruction Submittals															
			Qualifications	1.4	FIO													
			SD-02 Shop Drawings															
			Concrete Reinforcement System		G	DO												
			SD-07 Certificates															
			Reinforcing Steel	2.1	G	RO												
		03301A	SD-06 Test Reports															
			Mixture Proportions	1.6	G	RO												
			Testing and Inspection for	3.10	G	RO												
			Contractor Quality Control															
			SD-07 Certificates															
			Qualifications	1.4	G	RO												
		03425	SD-02 Shop Drawings															
			Erection	3.8	G	RO												
			Erection Plan	3.8.2	G	RO												
			SD-03 Product Data															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03425	Concrete Mixture Proportions	2.2.2	G	RO												
			SD-06 Test Reports															
			Materials	2.1	FIO													
			Concrete	1.3.2.1	FIO													
			SD-07 Certificates															
			Cement	2.1.1	FIO													
			Pozzolan		FIO													
			Air-Entraining Admixture	2.1.2.2	FIO													
			Water-Reducing Admixture	2.1.2.2	FIO													
			Accelerating Admixture	2.1.2.2	FIO													
			Aggregates	2.1.2.1	FIO													
			Air Content	1.3.2.2	FIO													
		04200	SD-03 Product Data															
			Cold Weather Installation	3.1.2	G	RO												
			SD-06 Test Reports															
			Masonry Cement		G	RO												
			SD-07 Certificates															
			Concrete Brick		FIO													
			Concrete Masonry Units (CMU)	2.2	FIO													
			Mortar Admixtures		FIO													
			Grout Admixtures		FIO													
		05055A	SD-04 Samples															
			Detail Drawings	2.2.1	G	DO												
			SD-07 Certificates															
			Materials Orders	2.1.1	FIO													
			Materials List	2.1.2	FIO													

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		05055A	Shipping Bill	2.1.3	FIO													
			SD-08 Manufacturer's Instructions															
			Welding Procedures for Structural	2.2.2.1	G RO													
			Steel															
			Welding Procedures for Aluminum	2.2.2.2	G RO													
			SD-09 Manufacturer's Field															
			Reports															
			Tests, Inspections, and	2.3	FIO													
			Verifications															
			Qualification of Welders and	1.4	FIO													
			Welding Operators															
		05120	SD-02 Shop Drawings															
			Structural Steel System		G DO													
			Structural Connections		G DO													
			SD-04 Samples															
			High Strength Bolts and Nuts		G RO													
			Carbon Steel Bolts and Nuts		G RO													
			Nuts Dimensional Style		G RO													
			Washers		G RO													
			SD-05 Design Data															
			Erection		G RO													
			SD-07 Certificates															
			Mill Test Reports		G RO													
			Welder Qualifications		G RO													
			Fabrication		G RO													
		05502A	SD-02 Shop Drawings															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05502A	Shop Fabricated Metal Items	2.2	G	DO												
			SD-03 Product Data															
			Miscellaneous Metals and	2.1	G	RO												
			Standard Metal Articles															
			Shop Fabricated Metal Items	2.2	G	RO												
			SD-06 Test Reports															
			Miscellaneous Metals and	2.1	G	RO												
			Standard Metal Articles															
			Shop Fabricated Metal Items	2.2	G	RO												
			SD-04 Samples															
			Miscellaneous Metals and	2.1	G	RO												
			Standard Metal Articles															
			Shop Fabricated Metal Items	2.2	G	RO												
			Miscellaneous Metals and	2.1	G	RO												
			Standard Metal Articles															
			Shop Fabricated Metal Items	2.2	G	RO												
		07920	SD-03 Product Data															
			Materials		FIO													
		09900	SD-03 Product Data															
			Paint	2.1	G	RO												
			SD-06 Test Reports															
			Paint	2.1	G	RO												
			SD-08 Manufacturer's Instructions															
			Mixing and Thinning	3.3	G	RO												
			Application	3.4	G	RO												
		10430	SD-02 Shop Drawings															

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		10430	Interpretive Signs	2.1	G	RO												
			SD-03 Product Data															
			Interpretive Signs	2.1	FIO													
			Graphics For Interpretive Signs	2.2	G	RO												
			Wind Load Requirements	1.5	FIO													
			SD-04 Samples															
			Support System for Interpretive	2.1.1	G	RO												
			Signs															
			Fiberglass Image Embedded	2.1.2	G	RO												
			Graphic Panels															
			SD-06 Test Reports															
			Testing	3.2	FIO													
			SD-07 Certificates															
			Testing	3.2	G	RO												

SECTION 01351

SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW/UST)

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

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 during excavation of contaminated river sediment and upland soils.

1.2 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-02	(1996) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z358.1	(1998) Emergency Eyewash and Shower Equipment

AMERICAN PETROLEUM INSTITUTE (API)

API Std 2015	(2001) Safe Entry and Cleaning of Petroleum Storage Tanks
API Publ 2219	(1999) Safe Operation of Vacuum Trucks in Petroleum Service
API RP 1604	(1996; R 2001) Closure Underground 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 385-1-1	(2003) 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

1.2.1 Other Publications

Pertinent information in the following publications shall also be followed in performing work specified in this section:

1. The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters, dated October 1997.

2. RCRA, 40 CFR, Part 261.

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 Preconstruction Submittals

Site Safety and Health Plan; G, RO

Submit a health and safety plan prepared in accordance with applicable NJDEP and OSHA guidelines, ER 385-1-92, Appendix B, Safety and Health Elements for HTRW, and OEW Documents, EM 385-1-1, Section 28, HTRW Activities, at least 30 days prior to starting work.

Exposure Monitoring/Air Sampling Program; G, RO

Submit a work plan at least 30 days prior to starting work.
Submit a work plan at least 30 days prior to starting work.

SD-02 Shop Drawings

Work Zones; G, RO

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; G, RO

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

SD-06 Test Reports

Monitoring/Sampling Results; G, RO

Submit a work plan at least 30 days prior to starting work.
Submit a work plan at least 30 days prior to starting work.

Site Control Log; G, RO

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

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 PRECONSTRUCTION SAFETY CONFERENCE

A preconstruction safety conference shall be scheduled by the Contractor within 5 working days after receipt of Notice to Proceed.

1.6 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.

1.7 SITE SAFETY AND HEALTH PLAN

1.7.1 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 plan shall include provisions for the excavation, transport, treatment, and disposal of contaminated material for the Project. 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.

1.7.1.1 Provisions in Plan

The plan shall include appropriate best management practices to be implemented in accordance with any applicable permits required for the Project. The procedures shall provide for safe conduct of the work, and 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. The plan shall include provisions for the excavation of contaminated material for the Project, as well as provisions for transport of all materials in closed, environmentally-contained systems to insure no spillage or leakage during transport. The plan shall identify the treatment and/or disposal facility and shall include copies of all required permits for the facility.

Prior to the start of construction, the Contractor shall be responsible for the identification of an approved treatment or disposal facility to accept the excavated contaminated material. The Contractor shall obtain approval from the State of New Jersey Department of Environmental Protection, Office of Dredging and Sediment Technology for use of the facility in accordance with the state Water Quality Certification prior to start of construction.

1.7.2 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 10 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.

1.7.3 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).

1.7.4 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.

1.8 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.8.1 Project Conditions

Information included at the end of this Section is a record of site contaminant testing for both river sediments and soil material. This information is provided to assist in preparing the SSHP.

1.8.1.1 Site Information

a. River sediment below Mean High Tide is classified as contaminated. Table I summarizes the river sediment testing conducted in 1995. The Contractor will be responsible for retesting the material for transfer to an approved landfill or processing facility. As described in Section 00800 SPECIAL CONTRACT REQUIREMENTS, the Contractor will be responsible for the identification of a suitable disposal facility or processing and treatment facility and must obtain approval from the State of New Jersey, Department of Environmental Protection, Office of Dredging and Sediment Technology, in accordance with the State Water Quality Certification and Coastal Zone Consistency Statement, for use of the approved facility. The Contractor shall also be responsible to receive approval from the Contracting Officer for use of the selected facility.

b. Soil material above Mean High Tide is classified as non-hazardous but requires special testing, handling, and disposal. Test results, provided at the end of this Section in Table II, indicate that several soil borings taken on site yielded contaminated levels above state cleanup criteria. The land side soil test samples were conducted in May through June of 1995, and were taken from test holes B-1, H-2, and H-3 of the Contract No. 4 work area. These sample points are illustrated on the construction plans and in figures 1 - 4. The soil test holes are the proximal reference testing points relative to the area of potential excavation land side of existing bulkhead in the Contract No. 4 work area and above mean high tide. The results of the land side soil testing reflect levels of several tested compounds exceeding New Jersey Department of Environmental Protection (NJDEP) Non-Residential Direct Contact Soil Cleanup Criteria and levels of several fuel hydrocarbons and trace metals exceeding the NJDEP Residential Direct Contact Soil Cleanup Criteria for composite soil samples taken from materials within 8 feet below grade.

Soil reuse for non-hazardous soil material exceeding NJDEP Soil Cleanup Criteria must be coordinated with the NJDEP. Testing of material to be excavated from above Mean High Tide and removed from the site should be coordinated with the NJDEP Division of Solid and Hazardous Waste, Bureau of Landfill and Recycling Management and the recycling or disposal facility chosen to accept the material. The testing results for soil test holes should be used only as a reference due to the time which has expired since sampling was conducted, and the difference in location of the sampling holes to the location of the materials to be excavated above Mean High Tide.

The Contractor shall be responsible for conducting a soil analysis test of excavated soil material to determine the levels of semi-volatile, volatile organic compounds and trace metals. The excavated material shall be stored on-site in water-tight containers until the test results have been analyzed

and an appropriate use determination has been made. Test results should be submitted to the District Environmental Analysis Branch POC as well as the NJDEP and the proposed landfill processing facility. Soil material that is tested and found not to exceed NJDEP Non-Residential Soil Cleanup Criteria but to exceed Residential Soil Cleanup Criteria may be utilized as backfill if suitable otherwise and is covered with a minimum of 6 inches clean fill. These activities should be in coordination with the Environmental Analysis Branch POC as well as with the NJDEP.

1.8.1.2 List of Available Documents

Further information may be available from the Corps of Engineers.

1.8.2 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.

1.8.3 Ordnance and Explosive Waste (OEW)

If explosives, chemical surety and warfare materials (CSM/CWM), or unexploded ordnance (UXO) are discovered at any time during operations, the Contractor shall immediately stop operations in the affected area, mark the location, notify onsite personnel of the OEW hazard and the area's restrictions, and notify the Contracting Officer. The Government will make appropriate arrangements for evaluation and proper disposal of each device. The SSHP shall specifically address procedures to be followed, if known or potential CSM/CWM, ordnance, or other such items are encountered during any phase of field work.

1.9 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.

1.9.1 Site Tasks and Operations

The SSHP shall include a comprehensive section that lists and 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 list shall be expanded and/or revised, as necessary.

1.9.2 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.

1.9.2.1 Safety Hazards

Contaminated river sediment and non-hazardous upland soils.

1.9.2.2 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.

1.9.3 Action Levels

1.9.3.1 General

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.

1.9.3.2 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.

1.10 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.

1.11 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.

1.11.1 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.

1.11.2 Safety and Health Manager

1.11.2.1 Qualifications

The services of an Industrial Hygienist certified by the American Board of Industrial Hygiene or a safety professional certified by the Board of Certified Safety Professionals shall be utilized. The name, qualifications (education summary and documentation, ABIH or BCSP 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 in the hazardous waste disposal industry.

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.

1.11.2.2 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 field 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.

1.11.3 Site Safety and Health Officer (SSHO)

1.11.3.1 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 in the hazardous waste disposal industry 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.

1.11.3.2 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 one work shift per day, a site Safety and Health Officer shall be present for each shift.

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, 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.

1.11.4 Occupational Physician (OP)

1.11.4.1 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.

1.11.4.2 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.

1.11.5 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.

1.11.6 Safety and Health Technicians

Not required.

1.11.7 Certified Health Physicist (CHP)

Not required.

1.11.8 Certified Safety Professional (CSP)

Not required.

1.12 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.

1.12.1 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.

1.12.2 Site-specific Training

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

1.12.2.1 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.

1.12.2.2 Periodic Sessions

Periodic onsite training shall be conducted by the SSHO at least weekly 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.

1.12.2.3 Other Training

The Safety and Health Manager shall provide training as specified by 29 CFR 1910 Section .146, for employees who are required to supervise, standby, or enter permit-required confined spaces.

1.13 PERSONAL PROTECTIVE EQUIPMENT

1.13.1 General

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.

1.13.2 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. Minimum levels of protection are Level D and Level D Modified. Upgrade to Level C may be required based on site conditions. The Contractor is responsible for refinements to these requirements based on project conditions. 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.

1.13.2.1 Components of Levels of Protection

Items which constitute minimum protective clothing and equipment ensembles to be utilized during this project, by level, shall be specified by the Corps of Engineers.

1.13.2.2 Initial Minimum Levels of PPE by Task

Excavation, sampling and decon shall be Level D Modified, as a minimum. All other tasks shall be Level D, as a minimum. Available site information shall be reviewed and the list of tasks and operations and these levels of protection shall be expanded and/or revised, by the Contractor, during preparation of the SSHP. These levels are initial levels of protection.

1.13.3 PPE for Government Personnel

Three clean sets of personal protective equipment and clothing (excluding 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 clean room of the decontamination facility 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.

1.14 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.

1.14.1 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).

1.14.2 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 should 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.

1.14.3 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.

1.14.4 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.

1.14.5 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.

1.15 RADIATION DOSIMETRY

Not required.

1.15.1 Evaluation

Radiation dosimetry shall be evaluated by an individual or company holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP). Electronic dosimetry may be used to assign external dose if approved by the Contracting Officer.

1.15.2 Documentation

Employee exposure to external radiation shall be documented. This shall include reviewing each employee's radiation exposure history in accordance with 10 CFR 20 Section .2104, for compliance with exposure standards prior to allowing the employee access to a restricted area. If the employee has no exposure history, the employee shall provide a signed written statement to that effect.

1.15.3 Bioassay

When the possibility of internal radioactive contamination exists, a

bioassay program shall be implemented to determine internal exposure. The bioassay program shall provide sampling of employee nasal passages, urine and/or feces, or whole body counting, as appropriate to evaluate the suspected radionuclides.

1.15.4 Reporting

Reports of exposure to ionizing radiation shall be furnished to the Contracting Officer as soon as available and to each employee annually, upon termination, and within 30 days of any personal request.

1.16 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 an exposure monitoring/air sampling program shall be submitted as part of the SSHP.

Minimum initial monitoring/sampling shall include the following chemical and physical hazards:

* FID and PID Organic Vapor
* Real time Aerosol
* Temperature and Humidity
* Noise

This listing shall be expanded, if additional hazards are identified. Sampling and monitoring for particular hazards may be deleted, if the Contractor can demonstrate that the risk is minimal and worst-case conditions could not exceed established exposure levels.

1.17 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.

1.17.1 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.

1.17.2 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-02.

1.18 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:

1.18.1 General Site Rules/Prohibitions

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

1.18.2 Work Permit Requirements

Radioactive work, excavation, hot work, confined space, etc..

1.18.3 Material Handling Procedures

Soils, liquids, radioactive materials.

1.18.3.1 Spill and Discharge Control

Written spill and discharge containment/control procedures shall be developed and implemented. These procedures shall address radioactive wastes, shock sensitive wastes, laboratory waste packs, material handling equipment, and appropriate procedures for tank and vault entry as well as drum and container handling, opening, 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.

1.18.3.2 Materials Transfer Safety

Liquids and residues shall be removed from the tanks using explosion-proof or air-driven pumps. Pump motors and suction hoses shall be bonded to the tank and grounded to prevent electrostatic ignition hazards. Use of a hand pump will be permitted to remove the last of the liquid from the bottom of the tanks. If a vacuum truck is used for removal of liquids or residues, the area of operation for the vacuum truck shall be vapor free. The truck shall be located upwind from the tank and outside the path of probable vapor travel. The vacuum pump exhaust gases shall be discharged through a hose of adequate size and length downwind of the truck and tank area. Vacuum truck operating and safety practices shall conform to API Publ 2219. Tank residues shall be collected in drums, tanks, or tank trucks labeled according to 49 CFR 171 and 49 CFR 172 and disposed of as specified. After the materials have been transferred and the tanks have been exposed, fittings and lines leading to the tanks shall be disconnected and drained of their contents. The contents of the lines shall not spill to the environment during cutting or disconnecting of tank fittings. Materials drained shall be transferred into DOT-approved drums for storage and/or transportation. Only non-sparking or non-heat producing tools shall be used to disconnect and drain or to cut through tank fittings. Electrical

equipment (e.g., pumps, portable hand tools, etc.) used for tank preparation shall be explosion-proof. Following cutting or disconnecting of the fittings, openings leading to the tanks shall be plugged.

1.18.4 Drum and Container Handling

Procedures and Precautions (opening, sampling, overpacking).

1.18.5 Confined Space Entry Procedures

1.18.6 Hot Work

Hot work shall not be permitted on or within the tanks except as outlined herein. Prior to conducting hot work, a hot work permit shall be prepared and submitted. An example format for a hot work permit shall be included in the SSHP. The permit shall describe compliance with the following procedures. After tank interiors have been decontaminated, hot work may be conducted only when the tank is inerted, and to the extent necessary to begin dismantling the tanks. After decontamination of tank interiors, hot work shall not be performed unless monitoring indicates atmospheres within and immediately surrounding the tanks are less than 8% oxygen inside the tank and less than 10% of the LFL outside the tank; continuous monitoring shall continue until the hot work is completed. The hot work prohibition includes welding, cutting, grinding, sawing, or other similar operations which could be expected to potentially generate combustion-producing temperatures or sparks, or which could produce potentially hazardous fumes or vapors. An individual at each hot work site shall be designated as a fire watch. This person's sole responsibility shall be to monitor the hot work and have immediate access to the fire extinguisher located at each hot work site. A new permit shall be obtained at the start of each work shift during which hot work will be conducted.

1.18.7 Ignition Sources

1.18.8 Fire Protection and Prevention

1.18.9 Electrical Safety

1.18.10 Excavation and Trench Safety

1.18.11 Guarding of Machinery and Equipment

1.18.12 Lockout/Tagout

1.18.13 Fall Protection

1.18.14 Hazard Communication

1.18.15 Illumination

1.18.16 Sanitation

1.18.17 Engineering Controls

1.18.18 Process Safety Management

1.18.19 Signs and Labels

1.18.20 Waste Disposal

1.18.21 Tank Purging for Permit-Required Confined Space Entries

Tanks shall be purged for confined space entry. The flammable vapors shall be reduced to less than 10% of the LFL and the oxygen content shall be between 19.5% and 23.5%. Confined space entry into the tanks shall not be attempted unless absolutely necessary, as for example, to remove sludge from the tank. Flammable vapors may be exhausted from the tank by any of the methods from API RP 1604 listed below, or any method approved by the Contracting Officer. The SSHP shall specify the purging method to be used.

a. Ventilation by Eductor-Type Air Movers: The eductor-type air mover shall be properly bonded and grounded to prevent the generation and discharge of static electricity. When using this method, the fill (drop) tube shall remain in place to ensure ventilation at the bottom of the tank. Tanks equipped with fill (drop) tubes that are not removable shall be purged by this method. An eductor extension shall be used to discharge vapors a minimum of 12 feet above grade or 3 feet above adjacent roof lines, whichever is greater. If this is not possible, alternative methods shall be proposed and approved prior to purging. Noise levels generated by these devices as a result of high airflow may exceed OSHA PELs. Noise levels shall be evaluated and appropriate hearing protection shall be provided.

b. Ventilation by Diffused Air Blowers: When using this purging method, the air-diffusing pipe is properly bonded and grounded to prevent the discharge of a spark. Fill (drop) tubes shall be removed to allow proper diffusion of the air in the tank. Air supply shall be from a compressor that has been checked to ensure that Grade D breathing air is being supplied. Air presure in the tank shall not exceed 5 psi gauge to avoid tank failure.

c. Commercial Emulsifiers and Volatile Fuel Encapsulators: These products are completely miscible in water, aid in the elimination of flammable vapors, and are biodegradable. Regulatory requirements for treatment and disposal of the water shall be determined prior to using this method. Standing outside the tank, the operator shall rinse the tank with a 3-to-6 percent solution of the product using a pressure sprayer through a tank opening. Explosive concentrations shall be measured at several levels (top, middle, and bottom) within the tank. If readings are greater than 10% of the LFL, the tank shall be rinsed again. When LFL readings are acceptable, the water in the tank shall be pumped out for disposal.

1.18.22 Tank Inerting (No Entry)

Following the removal of tank contents but prior to excavation of the tanks and tank preparation activities, the tanks shall be inerted only by introducing an inert gas, carbon dioxide (CO_2) or liquid nitrogen (N_2), to remove flammable vapors. Before inerting, all openings in the tanks shall be plugged with threaded or expansion type plugs except the vent tube and the opening to be used for introducing the inert gas. Within 30 minutes prior to initiating any activities (e.g., excavating, preparation, removal, opening, demolition, transportation, or other similar activities) involving a tank which has been inerted, the inerted nature of the tank (oxygen levels less than 8%) shall be verified.

a. CO_2 fire extinguishers shall not be used for inerting the tank interiors. If a compressed gas (e.g., CO_2 or N_2) is introduced into the tank the following requirements shall be met to prevent the buildup of static electricity:

(1) The UST and the compressed gas supply tank shall be bonded together and grounded.

(2) The compressed gas shall be supplied only at low flows.

(3) The liquid or gas shall be released at the tank bottom so that static electricity is not generated by liquid falling to the bottom of the tank. The tank shall be slowly filled from the bottom up.

b. Dry ice, which evolves CO_2 gas as it evaporates, if used, shall be introduced in the amount of at least 3 pounds per 100 gallons of tank capacity. Skin contact with dry ice shall be prevented by wearing heavy cloth gloves.

Sufficient quantities of inert gas (CO_2 or N_2) shall be introduced into the tanks to lower the oxygen content to less than 8%. Pressure inside the tank shall not exceed 5 psi. Prior to proceeding with additional activities on the tank (e.g., excavating), the oxygen content of the tanks shall be monitored to confirm that it is less than 8%. Additional oxygen level monitoring shall be conducted at least hourly while activities involving the tanks are underway but prior to decontamination of tank interiors; at least daily during periods in which the tanks are not being disturbed but prior to decontamination of their interiors; or as directed by the Contracting Officer. If

monitoring of tank interiors indicates that oxygen levels are not remaining below 8%, additional inert gas shall be introduced and more frequent oxygen monitoring shall be initiated.

d. During inerting procedures, an extension vent tube a minimum of 12 feet above grade or 3 feet above any adjacent (within 75 feet) roof lines, whichever is greater shall be used to discharge tank vapors. If this is not possible, alternative methods shall be proposed and approved prior to inerting. Continuous combustible gas/oxygen monitoring shall be conducted at the vent and inert gas introduction holes.

1.18.23 Tank Atmosphere Testing

The air within the storage tanks shall be monitored to ensure the space is either adequately purged and safe for personnel entry, or to ensure the tank has been adequately inerted and the oxygen content is less than 8%. In both instances, monitoring shall be performed at the top, bottom, and middle areas of the tanks to ensure stratification has not occurred. Monitoring results shall be reported to project personnel to ensure safe operations. Data shall be recorded as specified in paragraph EXPOSURE MONITORING/AIR SAMPLING PROGRAM.

1.18.23.1 Monitoring to Ensure Purging

When monitoring to ensure purging, both oxygen content and LFL readings are required. Prior to obtaining LFL readings, the Contractor shall monitor the oxygen content of the space and verify that the combustible gas indicators are operating within the oxygen limits identified by the CGI manufacturer. Personnel shall not be permitted to enter spaces with oxygen levels less than 19.5%, except in emergencies, and then only when equipped with the proper PPE and when following permit-required confined space entry procedures. Toxic air contaminants shall be monitored as specified in paragraph EXPOSURE MONITORING/AIR SAMPLING PROGRAM.

1.18.23.2 Monitoring to Ensure Inerting

Inerted tanks shall be monitored to ensure oxygen readings remain below a maximum allowable percentage of 8% by volume.

1.18.24 Tank Lifting

Tanks shall be lifted using equipment with a rated capacity greater than the load to be lifted. Tanks shall be lifted by lifting eyes or by straps under the ends of the tanks. Tanks shall not be lifted by the manhole flange or by removing the bungs. Personnel shall be directed to remain away from the ends of the tanks and tanks shall be positioned, whenever possible, with the ends oriented away from occupied or traveled areas, due to potential for rupture. During transportation, the tanks shall be secured to prevent movement.

1.18.25 Tank Demolition

The tanks excavated as part of this project shall be demolished before being removed from the site unless they are transported directly to a state certified tank destruction facility. Demolition will not be permitted until a decontamination of the interiors and exteriors is complete. Demolition shall involve opening the tanks sufficiently to permanently prohibit further use as containers of liquids. Tanks shall be inerted and

tested before they are opened. Plans and procedures, including a list of materials and supplies, for safely and effectively demolishing the tanks shall be submitted in the SSHP.

1.18.26 Tank Cleaning

Safety practices and procedures for the cleaning of the storage tanks shall conform to API Std 2015. Opening of the tanks to permit decontamination shall be conducted utilizing only methods approved in the SSHP. The interior and exterior of the tank shall be decontaminated prior to removing it from the work site unless the tank is being transported directly to a state certified tank destruction facility. Plans and procedures, including materials and supplies, for safely and effectively opening the tanks, cleaning surfaces of the interior and exterior of the tanks, and disposing of the decontamination fluids shall be submitted in the SSHP. Volatile organic solvents shall not be permitted to be utilized for decontamination procedures. Personnel shall not enter any of the storage tanks as a part of this project, except when following permit-required confined space entry procedures. Decontamination fluids shall be collected and disposed. Upon completion of this project, written certification shall be made that the tank was properly decontaminated prior to being removed from the site.

1.19 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. The Contractor shall identify in the SSHP a methodology for preparing the site for use of heavy equipment or temporary structures in order to prevent exposure of contaminated soils. This methodology could include use of a variety of soil covering material/equipment support material to prevent exposure of contaminated soils such as gravel beds, horizontal laid sheetpile, or other material.

1.19.1 Work Zones

Initial anticipated work zone boundaries are shown on the drawings. Utilizing this guidance, 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 and 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.

1.19.2 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.

1.19.3 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. The list of operations shall be as specified by the Corps of Engineers.

1.19.4 Site Security

Site security shall be provided as specified by the Corps of Engineers. 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.

1.20 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.

1.20.1 Decontamination Facilities

The following facilities shall be provided:

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 street clothing and contaminated PPE and shall be equipped with heating, lighting, ventilation, a change room and lockers, hot and cold water, shower facilities with hot and cold water, towels, soap in sufficient quantities for all anticipated personnel, and waste water storage facilities for controlling the disposal of used water. Laundry facilities or provisions of laundry service. If an off-site laundry service is used, they shall be notified, in writing, of the possibility and nature of contaminants expected on clothing.

1.20.2 Procedures

Minimum decontamination procedures shall be as specified by the Corps of Engineers. Available site information shall be reviewed and these procedures shall be expanded and/or revised for submittal as part of the SSHP.

1.21 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.

1.21.1 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 include the following: A traffic surface consisting of a minimum of 12 inches of crushed rock. The crushed rock shall be underlayed by a chemically resistant impermeable flexible membrane, such as HDPE, PVC or VLDPE with a minimum thickness of 40 mils. The liner shall be protected from damage on top with a geotextile. The base layer of soil on which the membrane is placed shall be free of objects greater than 0.375 inches in diameter and any other materials which could puncture or damage the membrane. The 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. High pressure, low volume, water wash area for equipment and vehicles. A steam cleaning system for use after the mud and/or site material has been cleaned from the equipment. A designated "clean area" in the CRZ for performing equipment maintenance. This area shall be used when personnel are required by normal practices to come in contact with the ground, i.e., crawling under a vehicle to change engine oil. Equipment within the EZ or CRZ shall be decontaminated before maintenance is performed.

1.21.2 Procedures

Procedures for equipment decontamination shall be developed and utilized to prevent the spread of contamination into the SZ and off-site 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.

1.22 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 escape purposes, 4 5- to 15-minute emergency escape masks shall be supplied. 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-A:120-B:C 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.

1.23 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.

1.24 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.

1.25 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.

1.26 SAFETY AND HEALTH PHASE-OUT REPORT

A Safety and Health Phase-Out Report shall be submitted within 10 working 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 onsite facilities.

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

d. Signatures of Safety and Health Manager and SSHO.

1.27 PAYMENT

Separate payment will not be made for providing and maintaining an effective Safety Health, and Emergency Response (HTRW/UST) program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

EXAMPLE CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGMENT

PROJECT NAME CONTRACT NO.
PROJECT ADDRESS
CONTRACTOR'S NAME
EMPLOYEE'S/VISITOR'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/my Employer'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/my employer's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. 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 x-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/Visitor's Signature _____
Date _____

Printed Name _____

Social Security Number _____

Contractor's Site Safety and Health Officer Signature _____

Date _____

Printed Name _____

Social Security Number _____

-- End of Section --

Construction Contract No. 4
RIVER SEDIMENT ANALYSIS DATA

The below is a Summary Table of the Hazardous, Toxic and Radioactive Waste (HTRW) River Sediment Sampling and Testing conducted for the Minish Project in Contract Area No. 4 in 1995. The contractor should be aware of the environmental contamination in this former industrial area. A Health and Safety plan must adequately address safe handling of soil and river sediment materials.

TABLE 1

Summary of River Sediment Sampling and Testing for Contaminant Levels

Contract Area No. 4

Refer to Figures 1-4 or Site Plans for Referenced Soil Borings

Contaminant	Test Result Level (ug/g)	NJDEP Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (mg/kg)	X=exceeds both criteria
WTH-1				
Semi-Volatile Organic Compounds				
0-6'				
Benzo(a) anthracene	1.7	0.9	4	
Benzo(b)fluoranthene	1.4	0.9	4	
Benzo(k)fluoranthene	1.3	0.9	4	
Benzo(a) pyrene	1.4	0.66	0.66	X
6-12'				
Benzo(a) anthracene	25	0.9	4	X
Benzo(b) fluoranthene	9.9	0.9	4	X
Benzo(k)fluoranthene	9.9	0.9	4	X
Benzo(a) pyrene	21	0.66	0.66	X
Indeno (1,2,3-cd) pyrene	7.8	0.9	4	X
Dibenz (a,h) anthracene	4.8	0.66	0.66	X
Chrysene	22	9	40	
TAL Metals				
0-6'				
Cadmium	2.5	1	100	
Lead	180	400	600	
6-12'				
Lead	1300	400	600	X
Arsenic	21	20	20	X
Cadmium	3.8	1	100	
WTH-2				
Semi-Volatile Organic Compounds				
0-6'				

Contaminant	Test Result Level (ug/g)	Res. level (ug/g)	Non-res. Level (ug/g)	X=exceeds both criteria
Benzo(a) pyrene	100	0.66	0.66	X
Benzo(b) fluoranthene	85	0.9	4	X
Indeno (1,2,3-cd) pyrene	34	0.9	4	X
Benzo(a) anthracene	120	0.9	4	X
Benzo(k)fluoranthene	77	0.9	4	X
Dibenz (a,h) anthracene	18	0.66	0.66	X
6-12'				
Benzo(a) pyrene	3.4	0.66	0.66	X
Benzo(b) fluoranthene	2.7	0.9	4	X
Indeno (1,2,3-cd) pyrene	1.5	0.9	4	X
Benzo(a) anthracene	4	0.9	4	X
Benzo(k)fluoranthene	2.4	0.9	4	
Dibenz (a,h) anthracene	0.83	0.66	0.66	X
TAL Metals				
0-6'				
Arsenic	54	20	20	X
Lead	790	400	600	X
Cadmium	6.5	1	100	
WTH-3				
Semi-Volatile Organic Compounds				
0-6'				
Benzo(a) pyrene	1.1	0.66	0.66	
Benzo(b) fluoranthene	1.1	0.9	4	
Benzo(a) anthracene	1.2	0.9	4	
Benzo (k) fluoranthene	1.3	0.9	4	
6-12'				
Benzo(a) pyrene	21	0.66	0.66	X
Benzo(b) fluoranthene	16	0.9	4	X
Indeno (1,2,3-cd) pyrene	11	0.9	4	X
Benzo(a) anthracene	28	0.9	4	X
Benzo (k) fluoranthene	16	0.9	4	X
Dibenz (a,h) anthracene	4.6	0.66	0.66	X
TAL Metals				
0-6'				
Arsenic	4700	20	20	X
Cadmium	5.4	1	100	
Antimony	290	14	340	
Lead	22000	400	600	X
6-12'				
Arsenic	75	20	20	X
Cadmium	5.1	1	100	

Contaminant	Test Result Level (ug/g)	Res. level (ug/g)	Non-res. Level (ug/g)	X=exceeds both criteria
Antimony	19	14	340	
Lead	2800	400	600	X
Pesticides & PCBs	**(ug/kg)**			
0-6'				
Aldrin	110	40	170	
Dieldrin	67	42	180	
WTH-4				
Semi-Volatile Organic Compounds				
0-6'				
Benzo(b) fluoranthene	13	0.9	4	X
Benzo(k) fluoranthene	13	0.9	4	X
Bis (2-ethylhexl) phthalate	89	49	210	
Benzo(a) anthracene	15	0.9	4	X
Indeno (1,2,3-cd) pyrene	6.6	0.9	4	X
Benzo(a) pyrene	14	0.66	0.66	X
Dibenz (a,h) anthracene	3.0	0.66	0.66	X
Chrysene	17	9	40	
6-12'				
Benzo(b) fluoranthene	18	0.9	4	X
Benzo(k) fluoranthene	10	0.9	4	X
Bis (2-ethylhexl) phthalate	85	49	210	
Benzo(a) anthracene	24	0.9	4	X
Indeno (1,2,3-cd) pyrene	9.2	0.9	4	X
Benzo(a) pyrene	20	0.66	0.66	X
Dibenz (a,h) anthracene	4.2	0.66	0.66	X
Chrysene	23	9	40	
TAL Metals				
0-6'				
Cadmium	18	39	100	
Lead	610	400	600	X
Arsenic	26	20	20	X
Pesticides & PCBs	**(ug/kg)**			
0-6'				
Dieldrin	77	42	180	
WTH-5				
Semi-Volatile Organic Compounds				
0-6'				
Benzo(b) fluoranthene	8.9	0.9	4	X
Benzo(k) fluoranthene	5.1	0.9	4	X
Benzo(a) anthracene	9.5	0.9	4	X

Contaminant	Test Result Level (ug/g)	Res. level (ug/g)	Non-res. Level (ug/g)	X=exceeds both criteria
Indeno (1,2,3-cd) pyrene	3.9	0.9	4	
Benzo(a) pyrene	8.2	0.66	0.66	X
Dibenz (a,h) anthracene	1.6	0.66	0.66	X
6-12'				
Benzo(b) fluoranthene	1.7	0.9	4	
Benzo(k) fluoranthene	1.7	0.9	4	
Benzo(a) anthracene	2.3	0.9	4	
Indeno (1,2,3-cd) pyrene	1.2	0.9	4	
Benzo(a) pyrene	1.8	0.66	0.66	X
TAL Metals				
0-6'				
Cadmium	11	39	100	
Lead	360	400	600	
6-12'				
Cadmium	3.1	39	100	
Lead	180	400	600	
Pesticides & PCBs	**(ug/kg)**			
0-6'				
Dieldrin	120	42	180	

Construction Contract No. 4
Soil Analysis Results

The below is a Summary Table of the Hazardous, Toxic and Radioactive Waste (HTRW) Soil Sampling and Testing conducted for the Minish Project in Contract Area 4 in 1995. The contractor should be aware of the environmental contamination in this former industrial area. A Health and Safety plan must adequately address safe handling of soil and river sediment materials.

TABLE 2

Summary of Soil Sediment Sampling and Testing for Contaminant Levels

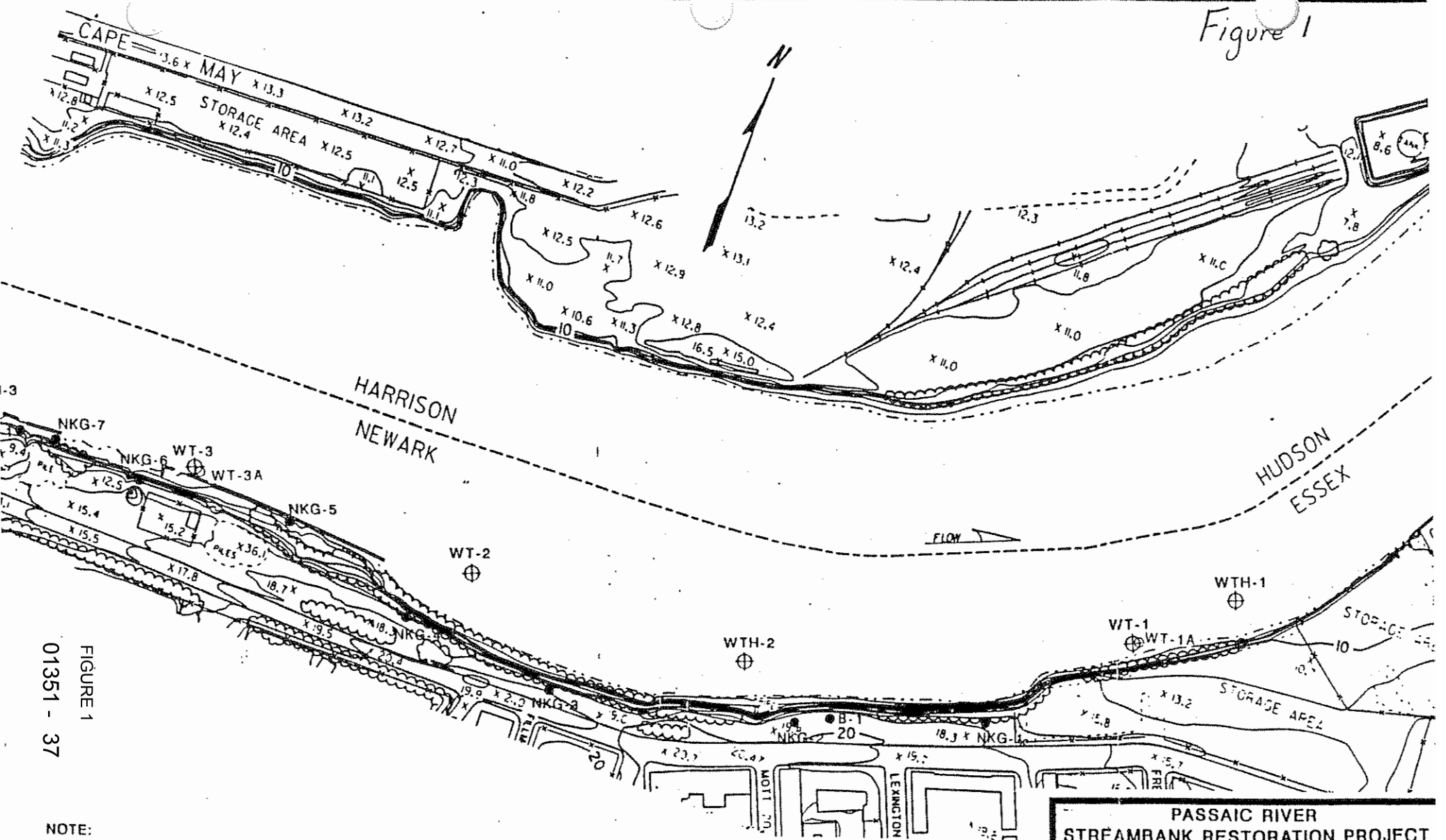
Contract Area No. 4

Refer to Figures 1-4 or Site Plans for Referenced Soil Borings

Contaminant	Test Result Level (ug/g)	NJDEP Residential Direct Soil Cleanup Criteria (mg/kg)	NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (mg/kg)	X=exceeds both criteria
B-1				
Semi-Volatile Organic Compounds				
0-8'				
Benzo(b)/(k) fluoranthene	1.1	0.9	4	
8-16'				
Benzo(a) anthracene	3.0	0.9	4	
Benzo(b)/(k) fluoranthene	5.1	0.9	4	X
Benzo(a) pyrene	2.6	0.66	0.66	X
Indeno (1,2,3-cd) pyrene	1.1	0.9	4	
TAL Metals				
0-8'				
Cadmium	1.1	1	100	
8-16'				
Lead	260	400	600	
H-1				
Semi-Volatile Organic Compounds				
0-8'				
Benzo(a) pyrene	1.2	0.66	0.66	X
Benzo(b) fluoranthene	2.2	0.9	4	
Indeno (1,2,3-cd) pyrene	1.3	0.9	4	
Benzo(a) anthracene	1.3	0.9	4	
TAL Metals				
0-8'				
Arsenic	210	20	20	X
Lead	770	400	600	X
Cadmium	3.4	1	100	
8-16'				

Arsenic	460	20	20	X
Cadmium	1.1	1	100	
H-1 Well		Surface Water Quality Standards		
Arsenic	2300 ug/L	200 ug/L	Surface Water Quality Standards	
Antimony	190 ug/L	200 ug/L		
H-2				
Semi-Volatile Organic Compounds				
0-10'				
Benzo(a) pyrene	120	0.66	0.66	X
Benzo(b)/(k) fluoranthene	86	0.9	4	X
Indeno (1,2,3-cd) pyrene	54	0.9	4	X
Benzo(a) anthracene	180	0.9	4	X
Benzo (k) fluoranthene	86	0.9	4	X
Dibenzo (a,h) anthracene	4.6	0.66	0.66	X
10-25'				
Benzo(a) pyrene	38	0.66	0.66	X
Benzo(b)/(k) fluoranthene	26	0.9	4	X
Indeno (1,2,3-cd) pyrene	15	0.9	4	X
Benzo(a) anthracene	31	0.9	4	X
Benzo (k) fluoranthene	26	0.9	4	X
Dibenzo (a,h) anthracene	3.4	0.66	0.66	X
TAL Metals				
0-10'				
Arsenic	67	20	20	X
10-25'				
Arsenic	22	20	20	X
H-3				
Semi-Volatile Organic Compounds				
0-4'				
Benzo(b)/(k) fluoranthene	8.5	0.9	4	X
Benzo(a) pyrene	5.4	0.66	0.66	X
Indeno (1,2,3-cd) pyrene	2.6	0.9	4	
Benzo(a) anthracene	6.0	0.9	4	X
TAL Metals				
0-4'				
Cadmium	3.5	1	100	
Lead	3500	400	600	X

Figure 1



NOTE:

THE REFERENCE FOR THIS DRAWING IS A BASE MAP OBTAINED FROM AN UNTITLED CAD FILE DRAWING PROVIDED TO DAMES AND MOORE FROM USACE-PASSAIC RIVER DIVISION

LEGEND:

- ⊕ OFF-SHORE BORING BY DAMES & MOORE, 1995
- ○ OFF-SHORE OFFSET BORING BY DAMES & MOORE, 1995
- ● BORING BY OTHERS

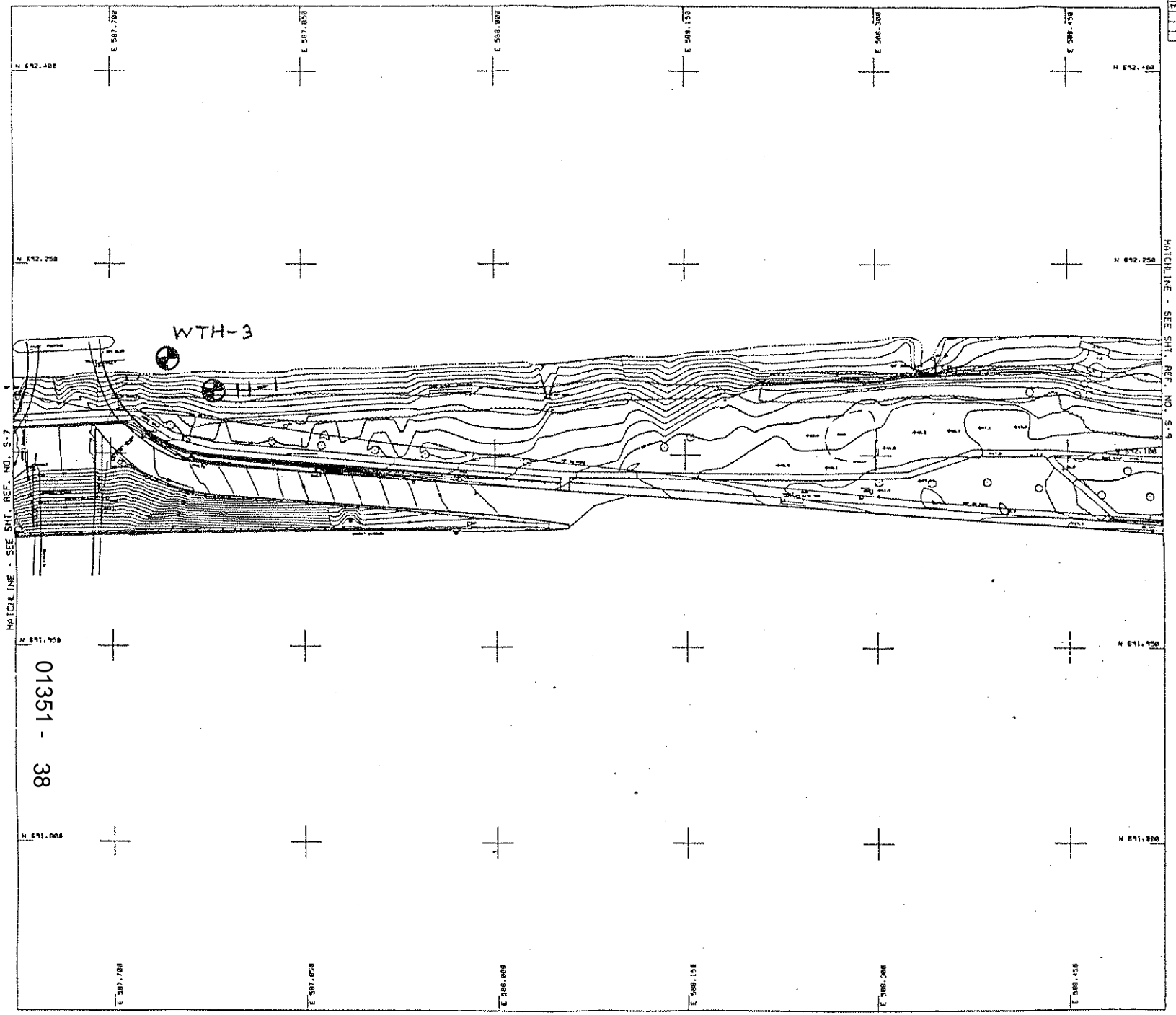
200 0 200 400
scale feet
APPROXIMATE SCALE: 1" = 200 FT.

PASSAIC RIVER
STREAMBANK RESTORATION PROJECT
NEWARK, NEW JERSEY

PLOT PLAN

DATE: 6/1/95	JOB NO: 00836-037	FIGURE
Dames & Moore, Inc. CRANFORD, NEW JERSEY		B-5

FIGURE 1
01351 - 37



U.S. ARMY

REVISIONS

KEY MAP

Fig 2

LEGEND

THIS MAP WAS COMPILED BY FIELD SURVEYS AND ON-SITE INVESTIGATION. SUBSURFACE UTILITY INFORMATION OBTAINED FROM VARIOUS SOURCE MAPS SUPPLIED BY UTILITY COMPANIES AND MUNICIPAL ENGINEERS.

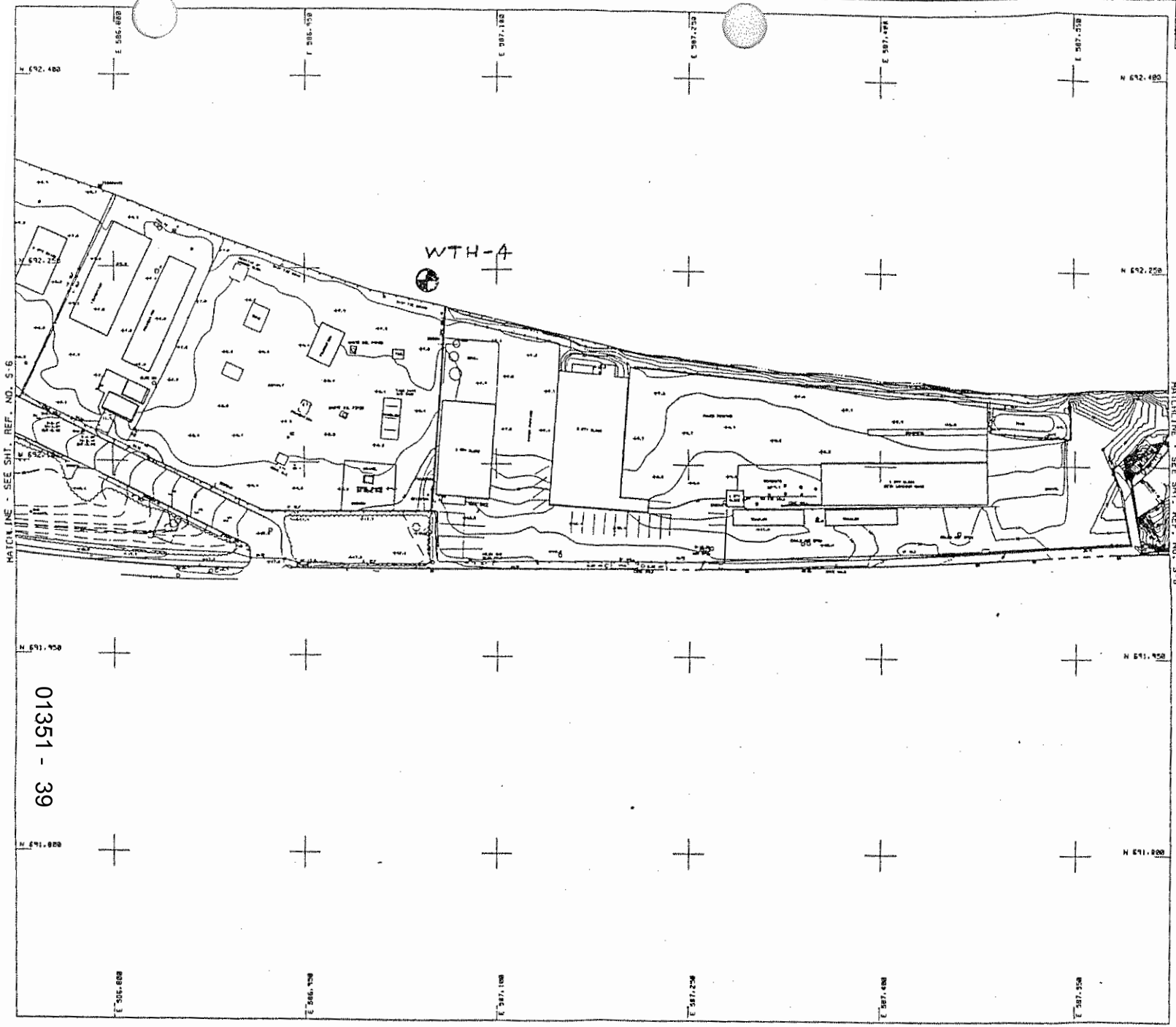
0 30 60 90 120 150 FT

SCALE

JOSEPH G. MINISH
PASSAIC RIVER WATERFRONT
PARK AND HISTORIC AREA
NEWARK, NEWJERSEY

S-8

01351 - 38



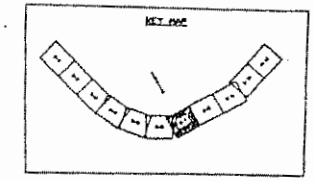


Fig 3

LEGEND

THIS MAP WAS COMPILED BY FIELD SURVEYS AND ON-SITE INVESTIGATION. SUBSURFACE UTILITY INFORMATION OBTAINED FROM VARIOUS SOURCE MAPS SUPPLIED BY UTILITY COMPANIES AND MUNICIPAL ENGINEERS.

0 30 60 90 120 150 FT

SCALE

JOSEPH D. MINISH
PASSAIC RIVER WATERFRONT
PARK AND HISTORIC AREA
NEWARK, NEWJERSEY

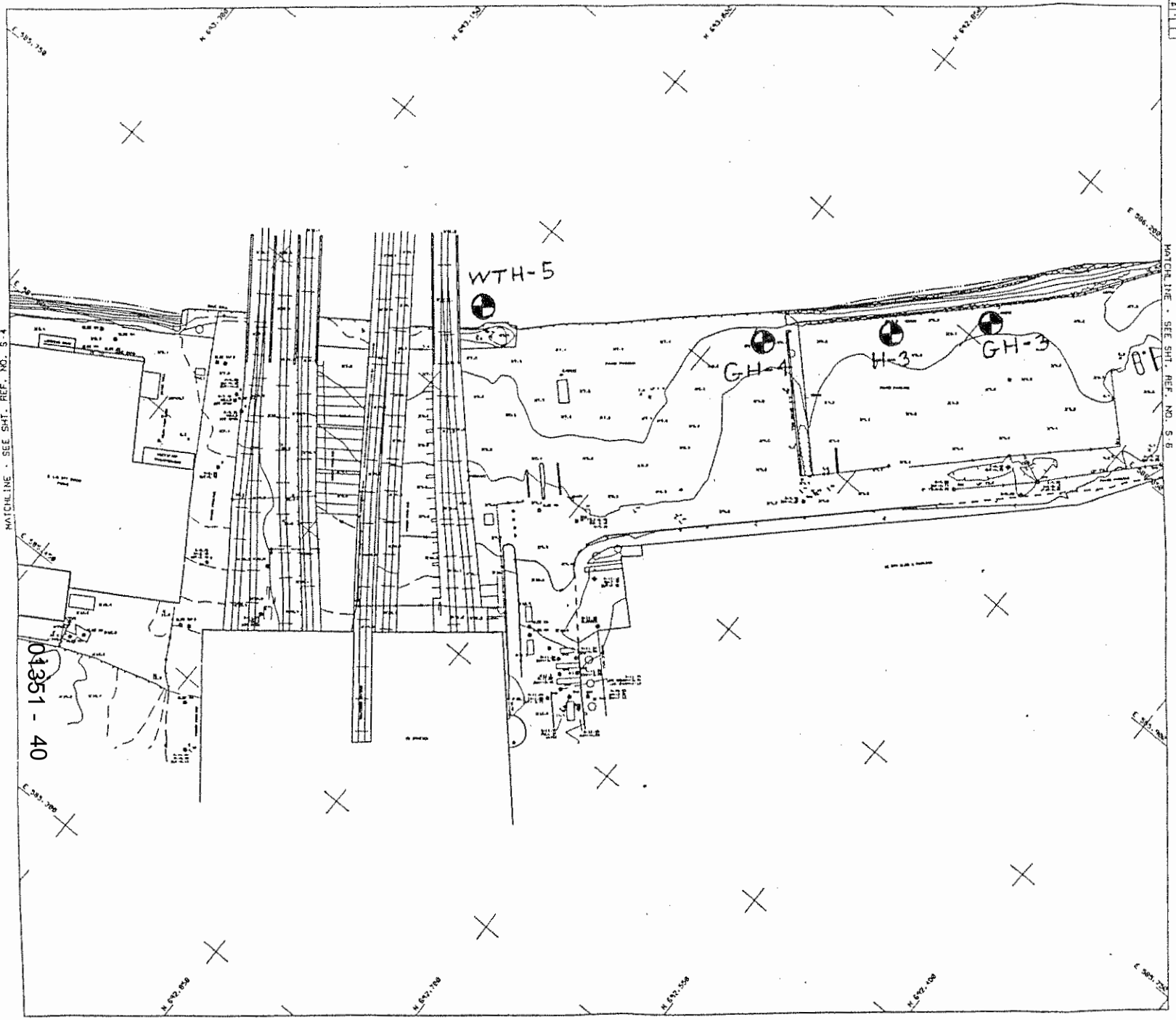
S-7

01351 - 39

CORPS OF ENGINEERS | 4 | 3 | 2 | 1 | U.S. ARMY

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVED



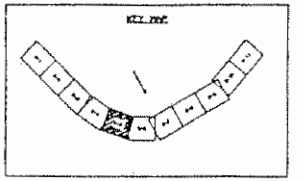


Fig 4

LEGEND

THIS MAP WAS COMPILED BY FIELD SURVEYS AND ON-SITE INVESTIGATION. SUBSURFACE UTILITY INFORMATION OBTAINED FROM VARIOUS SOURCE MAPS SUPPLIED BY UTILITY COMPANIES AND MUNICIPAL ENGINEERS.

0 30 60 90 120 150 FT

SCALE

DESIGNED BY: | DRAWN BY: | CHECKED BY: | SUPERVISED BY:

JOSEPH G. HINISH
PASSAIC RIVER WATERFRONT
PARK AND HISTORIC AREA
NEWARK, NEW JERSEY

SHEET NO. S-5

01351 - 40

5 | 4 | 3 | 2

SECTION 01410

ENVIRONMENT PROTECTION

Item Number 35: Tree Protection Materials

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The Contractor shall perform the work minimizing environmental pollution and damage as the result of construction operations. Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, as well as other pollutants. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall comply with all requirements under the terms and conditions set forth in the permits or certificates obtained by the U.S. Army Corps of Engineers (USACE) and New Jersey Department of Environmental Protection (NJDEP). Permits and certificates obtained by USACE and NJDEP are included in Section 00902 APPENDIX B - FEDERAL CONSISTENCY DETERMINATION/WATER QUALITY CERTIFICATION.

1.1.1 Subcontractors

The Contractor shall ensure compliance with this section by subcontractors.

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 Preconstruction Submittals

Environmental Protection Plan; G, RO

An environmental protection plan shall be submitted within 15 days after receipt of the notice to proceed.

SD-03 Product Data

Tree Protection Materials; G, RO

Submit product data and equipment list 30 days prior to starting work.

1.3 ENVIRONMENTAL PROTECTION PLAN

The Contractor shall submit an environmental protection plan within 15 days after receipt of the notice to proceed. Approval of the Contractor's plan will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures. The environmental protection plan shall include, but shall not be limited to, the following:

a. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.

b. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses and ground cover, landscape features, culverts to remain in place, air and water quality, fish and wildlife, soil, historical, archaeological, and cultural resources.

c. Procedures to be implemented to provide the required environmental protection, to comply with the applicable laws and regulations, and to correct pollution due to accident, natural causes, or failure to follow the procedures of the environmental protection plan.

d. Location of the solid waste disposal area.

e. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.

f. Environmental monitoring plans for the job site, including land, water, air, and noise monitoring.

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

h. Methods of protecting surface and ground water during construction activities.

i. Plan showing the proposed activity in each portion of the work area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas.

j. Drawing of borrow area location. Protection measures required at the work site shall apply to the borrow areas including final restoration for subsequent beneficial use of the land.

k. A recycling and waste prevention plan with a list of measures to reduce consumption of energy and natural resources; for example: the possibility to shred fallen trees and use them as mulch shall be considered as an alternative to burning or burial.

l. A settling pond removal plan 120 days prior to removal work. The

plan shall include the method of removing and testing of the collected sediment.

m. Training for Contractor's personnel during the construction period.

n. Methods and timing for temporary seeding and temporary mulching if necessary.

1.4 Permits

The Contractor shall obtain all needed permits or licenses, except for those obtained by the Corps of Engineers/New Jersey Department of Environmental Protection (NJDEP) which are included in Section 00902 APPENDIX B - FEDERAL CONSISTENCY DETERMINATION/WATER QUALITY CERTIFICATION. NJDEP, through the national pollutant discharge elimination system (NPDES), requires general permits, a notice of intent, and a notice of discontinuation. The Contractor shall be responsible for implementing the terms and requirements of the appropriate permits as needed and for payment of all fees.

1.5 Preconstruction Survey

Prior to starting any onsite construction activities, the Contractor and the Contracting Officer shall make a joint condition survey after which the Contractor shall prepare a brief report indicating on a layout plan the condition of trees, shrubs and grassed areas immediately adjacent to work sites and adjacent to the assigned storage area and access routes as applicable. This report will be signed by both the Contracting Officer and the Contractor upon mutual agreement as to its accuracy and completeness.

1.6 Meetings

The Contractor shall meet with representatives of the Contracting Officer to alter the environmental protection plan as needed for compliance with the environmental pollution control program.

1.7 Notification

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with the previously mentioned Federal, State or local laws or regulations, permits, and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action when approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspensions.

1.8 Litigation

If work is suspended, delayed, or interrupted due to a court order of competent jurisdiction, the Contracting Officer will determine whether the order is due in any part to the acts or omissions of the Contractor, or subcontractors at any tier, not required by the terms of the contract. If it is determined that the order is not due to Contractor's failing, such suspension, delay, or interruption shall be considered as ordered by the Contracting Officer in the administration of the contract under the contract clause SUSPENSION OF WORK.

1.9 Previously Used Equipment

The Contractor shall thoroughly clean all construction equipment previously used at other sites before it is brought into the work areas, ensuring that soil residuals are removed and that egg deposits from plant pests are not present; the Contractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

1.10 Payment

No separate payment will be made for work covered under this section; all costs associated with this section shall be included in the contract unit and/or lump sum prices in the Bidding Schedule.

1.11 LAND RESOURCES

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

1.11.1 Work Area Limits

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

1.11.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

1.11.3 Unprotected Erodible Soils

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

1.11.4 Disturbed Areas

The Contractor shall effectively prevent erosion and control sedimentation through approved methods including, but not limited to, the following:

a. Retardation and control of runoff. Runoff from the construction site or from storms shall be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches, berms, and by any measures required by area wide plans under the Clean Water Act.

b. Erosion and sedimentation control devices. The Contractor shall construct or install temporary and permanent erosion and sedimentation control features as indicated on the drawings. Berms, dikes, drains, sedimentation fence, sedimentation basins, grassing, and mulching shall be maintained until permanent drainage and erosion control facilities are completed and operative.

c. Sediment basins. Sediment from construction areas shall be trapped in temporary or permanent sediment basins in accordance with the drawings. The basins shall accommodate the runoff of a local 5 year storm. After each storm, the basins shall be pumped dry and accumulated sediment shall be removed to maintain basin effectiveness. Overflow shall be controlled by paved weirs or by vertical overflow pipes. The collected topsoil sediment shall be reused for fill on the construction site, and/or stockpiled for use at another site. The Contractor shall institute effluent quality monitoring programs as required by State and local environmental agencies.

d. Temporary seeding and temporary mulching. For conditions including, but not limited to the following, the Contractor shall apply temporary seeding or temporary mulching: 1) the upland slopes are ready to be seeded or planted outside of the specified seasons; 2) a quick cover is required to prevent surface erosion; or 3) Contract delays require temporary erosion control measures.

1.11.5 Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Borrow areas shall be managed to minimize erosion and to prevent sediment from entering nearby waters. Spoil areas shall be managed and controlled to limit spoil intrusion into areas designated on the drawings and to prevent erosion of soil or sediment from entering nearby waters. Spoil areas shall be developed in accordance with the grading plan indicated on the drawings. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas from despoilment. The Contractor shall erect and use a vehicle-washing station to clean vehicles before they enter public roadways. Contaminated materials removed in the cleaning process shall be collected and disposed of in accordance with State regulations.

1.12 WATER RESOURCES

The Contractor shall keep construction activities under surveillance,

management, and control to avoid pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation when such application may cause contamination of the fresh water reserve. Monitoring of water areas affected by construction shall be the Contractor's responsibility. All water areas affected by construction activities shall be monitored by the Contractor.

1.12.1 Washing and Curing Water

Waste waters directly derived from construction activities shall not be allowed to enter water areas. Waste waters shall be collected and placed in retention ponds where suspended material can be settled out or the water evaporates to separate pollutants from the water. Analysis shall be performed and results reviewed and approved before water in retention ponds is discharged.

1.12.2 Cofferdam and Diversion Operations

Construction operations for dewatering and/or diversion shall be controlled at all times to limit the impact of water turbidity on the habitat for wildlife and on water quality for downstream use.

1.12.3 Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State or local government.

1.12.4 Fish and Wildlife

The Contractor shall minimize interference with, disturbance to, and damage of fish and wildlife. Species that require specific attention along with measures for their protection shall be listed by the Contractor prior to beginning of construction operations.

The Contractor shall avoid any construction activities that may result in excess siltation of the Passaic River during the migration of anadromous and semi-anadromous fish species from April 1 to June 30.

1.13 AIR RESOURCES

Equipment operation and activities or processes performed by the Contractor in accomplishing the specified construction shall be in accordance with all applicable local, state, and federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained. Monitoring of air quality shall be the Contractor's responsibility. All air areas affected by the construction activities shall be monitored by the Contractor. Monitoring results will be periodically reviewed by the Government to ensure compliance.

1.13.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas

within or outside the project boundaries free from particulates which would cause the air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The Contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

1.13.2 Hydrocarbons and Carbon Monoxide

Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

1.13.3 Odors

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

1.13.4 Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of all applicable local, state, and federal laws and standards.

1.14 WASTE DISPOSAL

Disposal of wastes shall be as specified in Section 02050 DEMOLITION and as specified herein.

1.14.1 Solid Wastes

Solid wastes shall be placed in containers which are emptied on a weekly schedule. Handling and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal.

1.14.2 Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in corrosion resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes shall be disposed of in accordance with Federal and local laws and regulations.

1.14.3 Hazardous Wastes

The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing and shall collect waste in suitable containers observing compatibility. The Contractor shall

transport hazardous waste off Government property and dispose of it in compliance with Federal and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer. Cleanup costs due to spills shall be the Contractor's responsibility. If the Contractor has to dispose of Hazardous Wastes/ Excess Hazardous Materials, he is responsible to prepare and sign the Waste Analysis/Waste Profiles and Land Ban Restrictions Forms in accordance with these documents and shall also prepare the Manifests for the shipments.

Finally, the Contractor must provide also the name and telephone number for the Emergency Response Information the US DOT requires to be provided in the Manifests and the person noted shall be fully knowledgable with the Manifests and the Hazardous Wastes/Excess Hazardous Materials and shall man this telephone number for 24 Hours per Day and 7 Days per Week during the shipment.

1.14.4 Burning

Burning will not be permitted.

1.15 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area will be so designated by the Contracting Officer if any has been identified. The Contractor shall take precautions to preserve all such resources as they existed at the time they were first pointed out. The Contractor shall provide and install protection for these resources and be responsible for their preservation during the life of the contract. If during excavation or other construction activities any previously unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rocks or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer. While waiting for instructions the Contractor shall record, report, and preserve the finds in accordance with all applicable local, state, and federal laws and standards.

1.16 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction.

1.17 RESTORATION OF LANDSCAPE DAMAGE

The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work areas.

1.18 MAINTENANCE OF POLLUTION FACILITIES

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

1.19 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection. The training shall include methods of detecting and avoiding

pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental pollution control.

PART 2 PRODUCTS

2.1 MATERIALS

Construction fencing: Construction fencing shall conform to the products requirements described in Section 02821 FENCING.

2.1.1 Tree Protection Materials

Pruning equipment: Shears, saws or other equipment for removing tree branches.

PART 3 EXECUTION

3.1 Protection of Trees

The Contractor shall protect existing trees marked to be preserved on the plans during the life of this Contract using the following methods.

1. For protection from construction equipment, the Contractor shall install construction fencing around the trees marked for preservation. The construction fencing shall be placed far enough away from trees, i.e. not less than the dripline of the tree or the perimeter of the canopy, so that tall equipment does not contact tree branches.

2. The Contractor shall limit soil placement over existing tree roots to a maximum of 3 inches.

3. The Contractor shall not do any work, including lowering grades or cutting tree roots, within the boundaries of the construction fencing.

4. The Contractor shall avoid spills of oil, gas, and other contaminants in the vicinity of the trees marked for preservation.

6. If damage to protected trees occurs under this Contract, the Contractor shall repair any damage to the crown, trunk, or root system immediately. If the damage causes the death of a tree marked to be preserved, the Contractor shall replace the tree to the satisfaction of the Contracting Officer at no additional cost to the Government. If repairs are necessary, they shall be made as follows and to the satfisfaction of the Contracting Officer:

   a. Roots shall be repaired by cutting off the damaged areas. Tree roots that must be severed should be cut clean. The Contractor shall spread moist top soil over exposed roots at a minimum depth of 3 inches.

   b. Damage to bark shall be repaired by trimming around the damaged area and tapering the cut to provide drainage.

   c. Broken branches shall be pruned using pruning equipment listed and approved by the Contracting Officer. The branch collar on all

branches whether living or dead should not be damaged. The 3 cut method shall be used on all branches between 2 to 6 inches in diameter at the cut. The 3 cut method is as follows: First, cut about one-third the way through the underside of the limb (about 6 to 12 inches from the tree trunk). Approximately 1 inch further from the tree trunk, make a second cut through the entire limb from the upper side and remove the branch. Lastly, remove the remaining stub. The 4 cut method shall be used if the branch is larger than 6 inches in diameter. For the 4 cut method, cuts 1 and 2 remain the same as the 3 cut system. Cut 3 should be from the underside of the limb, on the outside of the branch collar, and should be one-fourth to one-third the way through the limb. Cut 4 should be from the top and in alignment with the third cut.

7. During dry periods, the Contractor shall moisten the root zone of stressed trees. The water shall be allowed to soak in 12 to 18 inches deep by applying a slow trickle throughout the spread of the tree's roots.

8. Subsequent to completion of all earthwork activities and prior to the commencement of seeding operations, the Contractor shall remove construction fencing from around the preserved trees at the direction of the Contracting Officer. Fencing shall become the property of the Contractor and shall be removed from the Project Site and disposed of off-site.

3.2 Alternate Tree Protection Methods

If, at any time, the Contractor determines that construction of the proposed grades as shown on the plans will infringe upon the dripline or canopy perimeter of a tree marked to be preserved, the Contracting Officer shall be notified immediately and an alternate tree protection method shall be determined.

3.3 Protection of Culverts

A minimum of 1-foot of cover shall be provided over all culverts to remain.

-- End of Section --

SECTION 01420

SAFETY

1.0 **SAFETY**: The contractor shall comply with all applicable Federal, State, and local safety and occupational health laws and regulations. Applicable provisions of the Corps of Engineers manual entitled Safety and Health Requirements Manual EM 385-1-1, 3 Nov 2003 (with latest changes as of bid date) will be applied to all work under this contract. The referenced manual may be purchased from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328, or via the internet at www.USACE.army.mil.

1.1 **U.S. ARMY CORPS OF ENGINEERS SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385-1-1:** This paragraph applies to contracts and purchase orders that require the Contractor to comply with EM 385-1-1 (e.g. contracts that include the Accident Prevention Clause at FAR 52.236-13 and/or safety provisions). EM 385-1-1 and its changes are available at http://www.hq.usace.army.mil (at the HQ homepage, select Safety and Occupational Health and then select Changes to EM). The Contractor shall be responsible for complying with the current edition and all changes posted on the web as set in this solicitation.

2.0 **ACCIDENT PREVENTION PROGRAM**: Within fifteen (15) calendar days after receipt of Notice to Proceed, and at least ten (10) calendar days prior to the Preconstruction Safety Conference, four (4) copies of the Accident Prevention Plan shall be submitted for review and acceptance by the Contracting Officer or the Contracting Officers Representative (COR). The accident prevention program shall be prepared in the format outlined in Appendix A of EM 385-1-1, "Minimum Basic Requirements for Accident Prevention Plan".

3.0 **HAZARD ANALYSIS**: 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 1-2. 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 contractor or work crew is to perform. (See Contractor Quality Control specification for further guidance regarding coordination of "Activities" and "Principal Steps" indicated in the Activity Hazard Analysis with Contractor Quality Control activities). 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 on-site representative(s). The activity hazard analyses shall be continuously reviewed and when appropriate modified to address changing site conditions or operations, with the concurrence of the site safety representative, the site superintendent, and the Contracting Officer. Activity hazard analyses shall be attached to and become part of the accident prevention plan or may be developed prior to each phase of work undertaken in the contract and

attached to the Quality Control reports.

3.1 Hazard analysis shall be used to identify and evaluate all substances, agents, or environments that present hazards and recommend control measures. Engineering and administrative controls shall be used to control hazards; in cases where engineering or administrative controls are not feasible, personal protective equipment may be used.

3.2 Information contained in MSDS (Material Safety Data Sheets) shall be incorporated in the hazard analysis for the activities in which hazardous or toxic materials will be used, or generated (e.g. fiberglass, crystalline silica, metal dust or fume, etc.)

4.0 **SITE SAFETY OFFICER**: The contractor shall identify an individual directly employed by the contractor as Site Safety Officer (SSO) responsible to the Contractor to implement and continually enforce the Accident Prevention Plan. The site safety officer shall not be the same individual as the Quality Control System Manager if the CQC System Manager is required to have no duties other than Quality Control. The site safety officer shall have the authority to suspend operational activities if the health and safety of personnel are endangered, and to suspend an individual from operational activities for infractions of the Accident Prevention Plan. Additional safety staff or alternate SSO may be assigned as determined by the Contractor. Alternate SSO must meet the same qualifications as the SSO.

4.1. The name, qualifications (training and experience) of the designated Site Safety Officer shall be included in the Accident Prevention Plan. The Site safety officer shall have the following qualifications:

a. A minimum of 5 years construction experience with at least 2 years experience in implementing safety programs at construction work sites for projects of comparable scope and complexity.

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

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

d. Specific training in excavation safety, fall protection, and confined space.

e. CPR/First Aid certification (current).

f. Familiarity with and ability to use and implement the Corps of Engineers Safety Manual EM 385-1-1.

g. Successful completion within last 5 years (or as required by OSHA) of 10-hour OSHA Construction Safety Class.

4.2. Other Requirements: Other sections of the contract documents may also require separate specially qualified individuals in such areas a chemical data acquisition, sampling and analysis, medical monitoring, industrial hygiene, quality control, etc. Contractor must comply with all safety requirements.

5.0 **SITE INSPECTIONS**: The site safety officer shall perform frequent inspections of the job sites and the work in progress to ensure compliance

with EM 385-1-1 and to determine the effectiveness of the accident prevention plan. In addition, Quality Control personnel shall conduct and document daily safety inspections. Daily inspection logs shall be used to document inspections noting safety and health deficiencies, deficiencies in the effectiveness of the accident prevention plan, and corrective actions including timetable and responsibilities. The daily inspection logs will be attached to and submitted with the Daily Quality Control Reports or may be incorporated in the daily CQC report. Each entry shall include date, work area checked, employees present in work area, protective equipment and work equipment in use, special safety and health issues and notes, and signature of the preparer.

6.0 **HIGHLIGHTED PROVISIONS**: In addition to those items contained in EM 385-1-1, Appendix A, include the following items in the accident prevention plan:

6.1 Hard Hat Area. A statement that the jobsite is classified a "hard hat" area

6.2 Sanitation and Medical Requirements. Estimate the greatest number of employees, supervisors, etc., to be working at peak construction period, including subcontractor personnel. Include sanitation requirements and medical facilities identified for the job site. If a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, identify at least two or more employees on each shift who are qualified to administer first aid and CPR.

6.3 Equipment Inspection. The type of inspection program on cranes, trucks, and other types of construction equipment the Contractor plans to implement. Who will be responsible for the inspection and how the Contractor will control equipment of sub-contractors and equipment bought to the site by rental companies. Types of records to be kept.

6.3.1 Copies of records of all equipment inspections will be kept at the job site for review by the designated authority.

6.4 Crane & Derrick Operators: Written proof of qualification for all crane and derrick operators in accordance with EM 385-1-1, 16.C.05. Qualification shall be by written (or oral) examination and practical operating examination unless the operator is licensed by a state or city licensing agency for the particular type of crane or derrick. Proof of qualification shall be provided by the qualifying source.

7.0 **ACCIDENT REPORTS**: The contractor shall immediately report all accidents by telephone to the COR.

7.1 The Contractor will provide an initial written report of the accident to the COR within 24 hours. The Contractor shall complete and submit ENG Form 3394 for all accidents involving lost work time, medical treatment, and/or property damage in excess of $2000.00 within 48 hours of the accident. The report shall accurately represent the circumstances of the accident, cause of the accident, extent of medical treatment, extent of injuries and steps to prevent occurrence of similar accidents. The hazard analysis covering the work activity being undertaken during the accident shall be attached to the report.

7.2 Daily records of all first aid treatment not otherwise reportable shall be maintained at the job site and furnished to the designated

authority upon request. Records shall also be maintained of all exposure and accident experience incidental to the work (OSHA Form 300 or equivalent as prescribed by 29 CFR 1904).

8.0 **MONTHLY EXPOSURE REPORTS**: The Contractor shall submit to the COR no later than the 1st day of each month, a compilation of manhours worked each month by the prime contractor and each subcontractor. In addition ,the contractor shall report the number of accidents, severity, class of accidents, and lost time work days for each month.

9.0 **CLEAN-UP**: The Contractor's Accident Prevention Plan shall identify the individual's responsible for cleanup and shall establish a regular housekeeping procedure and schedule. If the COR determines that cleanup is not being performed satisfactorily, the Contractor shall establish a work crew to perform the continuous cleanup required by the contract clause titled: CLEANING UP: The number of individuals appointed to the cleanup work crew shall be increased as required in order to render adequate cleanup.

10.0 **FOCUS AREAS**: To supplement and emphasize the requirements of EM 385-1-1, the following is provided and shall be met as applicable.

10.1 Electrical Work: Electrical work shall not be performed on or near energized lines or equipment unless specified in the plans and specifications and approved by the COR. Plan and layout of proposed temporary power to the construction site shall be submitted and approved by the COR before work will be permitted.

10.1.1 Upon request by the Contractor, arrangements will be made for de-energizing lines and equipment so that work may be performed. All outages shall be requested through the COR a minimum of 14 days, unless otherwise specified, prior to the beginning of the specified outages. Dates and duration will be specified.

10.2 If approved by the COR, the following work may be performed with the lines energized using certified hot line equipment on lines above 600 volts, when the following conditions have been met:

a. work below the conductors no closer than the clearance required in EM 385-1-1 from the energized conductors.

b. setting and connection of new pre-trimmed poles in energized lines which do not replace an existing pole.

c. setting and removing transformers or other equipment on poles.

d. installation or removal of hot line connectors, jumpers, dead-end insulators for temporary isolation, etc., which are accomplished with hot line equipment from an insulated bucket truck.

10.3 Energized Line Work Plan: The Contractor shall submit a plan, in writing, describing his/her method of operation and the equipment to be used on energized lines. Proper certification from an approved source of the safe condition of all tools and equipment will be provided with the plan. The work will be planned and scheduled so that proper supervision is maintained. Emergency procedures, including communication, for disconnecting power in the event of an accident will be outlined in the plan. The Contractor will review his/her plan with the COR prior to being granted permission to perform the work.

10.4. No work on lines greater than 600 volts will be performed from the pole or without the use of an insulated bucket truck.

10.5 No work will be done on overbuilt lines while underbuilt lines are energized, except for temporary isolation and switching.

10.6 Electrical Tools and Cords: Hand held electrical tools shall be used only on circuits protected by ground fault circuit interrupters for protection of personnel. All general use extension cords shall be hard usage or extra hard usage. Damaged or repaired cords shall not be permitted.

10.7 Temporary electrical distribution systems and devices shall be checked and found acceptable for polarity, ground continuity, and ground resistance before initial use and after modification. GFI outlets shall be installed and tested with a GFI circuit tester (tripping device) prior to use. Portable and vehicle mounted generators shall be inspected for compliance with EM 385-1-1 and NFPA 70. All electrical equipment located outdoors or in wet locations shall be enclosed in weatherproof enclosures in accordance with EM 385-1-1. Records of all tests and inspections will be kept by the contractor and made available on site for review by the designated authority. Submit sketch of proposed temporary power for acceptance.

10.8 Seat belts and ROPS shall be installed on all construction equipment. The operating authority will furnish proof from the manufacturer or licensed engineer that ROPS meets the applicable SAE standards cited in EM 385-1-1, pg. 302.

10.9 Radiation Permits or Authorizations: Contractors contemplating the use of a licensed or DOD regulated radiological device or radioactive material on a DOD installation will secure appropriate permit or authorization from the Department of Army or Department of the Air Force, as applicable. A 45-day lead-time should be programmed for obtaining the necessary authorization or permit. When requested, the COR will assist the Contractor in obtaining the required permit or authorization.

10.9.1 The Contractor shall develop and implement a radiation safety program to comply with EM 385-1-1, Section 06.E. Provisions for leak tests, authorized personnel, transport certificates, etc. will be addressed in the radiation safety program.

10.10 Elevating Work Platforms: All elevating work platforms shall be designed, constructed, maintained, used, and operated in accordance with ANSI A92.3, ANSI A92.6, ANSI A92.5 and EM 385-1-1, Sections 22.J.

10.10.1 Only personnel trained in the use of elevating work platforms shall be authorized to use them. A list of authorized users will be maintained by the contractor at the job site. The list will be updated to remain current and made available for review on site by the designated authority. Personnel safety belts must be worn.

10.11 Fall Protection: Fall protection in the form of standard guardrails, nets, or personal fall arrest systems will be provided for all work conducted over 6 feet in height The contractor will submit his/her proposed method of fall protection to the COR as part of the Job Hazard Analysis for acceptance. If the contractor deems that conventional fall protection as described above is not feasible, or creates a greater hazard,

the Contractor will prepare a written fall protection plan in accordance with OSHA 29 CFR 1926.502(k). The plan will demonstrate the reasons that conventional fall protection is unfeasible or constitutes a greater hazard and will provide alternative safety measures for review and acceptance by the COR.

10.12 Excavations: All open excavations made in the earth's surface four (4) foot or greater will be under the supervision of a competent person trained in, and knowledgeable about, soils analysis, the use of protective systems, and the requirements of OSHA 29 CFR 1926, Subpart P and EM 385-1-1, Section 25. The competent person shall be designated in writing by the Contractor and a resume of their training and experience submitted to the COR for acceptance.

10.12.1 Excavations hazards and methods for their control will be specified in the job hazard analysis.

10.12.2 Sloping and benching: The design of sloping and benching shall be selected from and in accordance with written tabulated data, such as charts and tables. At least one copy of the tabulated data will be maintained at the job site.

10.12.3 Support Systems: shall be in accordance with one of the systems outlined in a through c below:

a. Designs drawn from manufacturer's specifications and in accordance with all specifications, limitations, and recommendations issued or made by the manufacturer. A copy of the manufacture's specifications, recommendations, and limitations will be in written form and maintained at the job site.

b. Designed by a registered engineer. At least one copy of the design shall be maintained at the job site during excavation.

c. Designs selected from and in accordance with tabulated data (such as tables and charts). At least one copy of the design shall be maintained at the job site during excavation

10.12.4 Excavations Greater than 20 Feet in Height: Sloping and benching or support systems shall be designed by a registered professional engineer. Designs shall be in writing and at least one copy of the design shall be maintained at the job site during excavation. The contractor will ensure that the registered professional engineer is working within a discipline applicable to the excavation work; i.e. it would be inappropriate for an electrical engineer to approve shoring designed for an excavation.

10.13 Confined Space: 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 explosive limit (LEL) reading is greater than 10%, unless these conditions are adequately addressed in the confined space entry plan. In addition, action levels for toxic atmospheres shall be determined and any other known or potential hazards eliminated prior to entry.

11.0 **LANGUAGE**: For each group that has employees that do not speak English, the Contractor will provide a bilingual foreman that is fluent in the language of the workers. The contractor will implement the requirements of EM 385-1-1, 01.B through these foremen.

12.0 **CONTRACTOR SAFETY MEETINGS AND DOCUMENTATION**: Contractor shall

conduct and document safety meetings among its personnel as required by EM 385-1-1 and as indicated herein. Monthly meetings shall be held among all supervisors, and weekly meetings shall be conducted by supervisors or foreman for all workers. The agenda of the meeting shall include specific safety items pertinent to work being performed. Documentation shall include a summary of items discussed as well as other items required by the EM 385-1-1. Documentation shall be submitted to the Government monthly.

13.0 **COORDINATION WITH OTHER SPECIFICATION SECTIONS**: The requirements of this section are meant to supplement requirements of other sections. In cases of discrepancies the most stringent requirements shall apply . Other safety-related requirements can be found in the following specification sections:

a. Specification Section 00800, Special Contract Requirements
b. Specification Section 00700, Contract Clauses, paragraph entitled "accident Prevention"
c. Specification Section entitled "Contractor Quality Control"
d. Other specifications or contract requirements relating to site safety or health requirement or medical monitoring.

14.0 **CONTRACTOR PERFORMANCE APPRAISAL**: The occurrence of accidents and near misses due to negligence are strong indications that there has been insufficient emphasis on effective implementation and/or commitment to the accident prevention program. Should it become obvious that only lip service is being given to this program, an interim unsatisfactory performance appraisal rating will be issued. If safety continues to be unsatisfactory or marginal, the unsatisfactory rating will become final. The contractor should be aware that this appraisal will be stored in a national computer database which can be accessed by a multitude of agencies or municipalities desiring information on prospective contractors. An unsatisfactory rating in this database may affect the contractor's ability to obtain future Government work.

-- 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 within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIAL (ASTM)

ASTM D 3740	(1999c) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1998a) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

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

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

Contractor Quality Plan (CQC); G, RO

Plan shall be submitted not later than 90 days after receipt of notice to proceed

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 entitled "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 off site,

and shall be keyed to the proposed construction sequence. For purposes of this section the term "construction" shall include all items of work, activities, materials and equipment as indicated in the contract documents. Other sections of the contract documents may also require separate, specially qualified individuals in such areas as chemical data acquisition, sampling and analysis, medical monitoring, industrial hygiene, safety officer, etc. The CQC organization will coordinate the activities of these individuals. 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 on-site individual with the responsibility for the overall management of the project including logistics and production.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 90 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause entitled "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 90 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 off site, including work by subcontractors, fabricator, 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 an officer in the Contractor's organization above the Project Superintendent, who is responsible for both quality and production.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Clear indication that CQC System Manager will have no duties other than Quality Control.

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 will also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing

submittals, including those of subcontractors, off site 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 incorporate all tests required by the contract (including systems commissioning and operating tests) to derive the above list of testing information which shall be presented in matrix form as part of the CQC Plan. This matrix shall be suitable for use by the Contractor and the Government as a checklist to control testing to be done on the contract. Coordinate any additional test submission or plan requirements for Mechanical and Electrical Systems with appropriate specialized specification section if applicable.

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation. Provide matrix of Preparatory and Initial Inspections including specification reference paragraph, the name of the Definable Feature of Work, and spaces for date performed, results, and names of attendees.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will 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 and has separate control requirements. It could be identified by different trades or disciplines, or it could 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 is frequently more than one definable feature under a particular section. This list will cover all features of work on the project, and will be agreed upon during the coordination meeting.

j. A brief explanation of the duties of the CQC organization with respect to safety. Note that separate Accident Prevention Plan and Hazards Analysis is required for submission and acceptance.

k. Contractor's plan for training all CQC personnel in the CQC System.

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 Pre-construction 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. The initial plan submitted must be found acceptable by the Government before the Coordination Meeting can be held. 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 off site 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 number of CQC personnel shall be increased as required during times of high construction workload. 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 his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, or shall hold a state Professional Engineer's license, with a minimum of 2 years construction experience on construction similar to this contract, one year of which as a Quality Control Representative. The CQC Manager may also be a construction person with a minimum of 4 years in related work, one year of which as a QC Representative. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC System Manager. The CQC System Manager shall be assigned no duties other than Quality Control.

3.4.3 Organizational Expertise

The CQC organization, which includes the CQC System Manager and additional qualified personnel, must as a minimum possess general corporate technical knowledge of all aspects of the project, and must successfully execute the

CQC System on all aspects of the project. Individuals possessing experience in specialized areas shall be added to the organization as required during periods when such specialty areas are being executed. Examples of such specialized areas would include HVAC, electrical distribution and substations, roofing, tele-communication systems, fire protection and alarm systems, computer installations, specialized welding, specialized finishes, precast concrete installation, modular housing, specialized geotech work, dredging, sand placement and surveying, chemical data acquisition, hazardous material removal and disposal, medical monitoring, etc., depending on the nature of the particular project. The Contractor must demonstrate that such additional qualified personnel have received sufficient training and indoctrination into the CQC system, and that these personnel properly execute the requirements of the CQC System within their areas of expertise.

3.4.4 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed within the last five years the course entitled "Construction Quality Management for Contractors". This course is given at a cost of $25 by Government personnel and is of two-day duration. The Government will provide one instruction manual for the course.

3.4.5 Organizational Changes

The Contractor shall maintain the CQC Organization at full strength at all times. When it is necessary to make changes to the organization, 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 and are submitted in accordance with the date on the submittal register. CQC personnel shall also make physical checks of materials and equipment before installation to insure compliance with approved shop drawings.

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 worksite, and 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 per EM 385-1-1, "Safety and Health Requirements Manual".

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

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

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase meeting. 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 clearly indicate its intent and plan for communication of the results of the preparatory phase to applicable workers, to include materials, construction methods, workmanship standards, safety considerations and procedures, and preparatory phase meeting minutes.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work (DFW) when the accomplishment of a representative sample of the work is impending.
The following shall be accomplished:

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

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

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

d. Resolve all differences.

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

worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase meeting. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), the foreman responsible for the definable feature and the work crew(s) for the appropriate DFW. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location (i.e. CQC Report number) of initial phase shall be indicated for future reference and comparison with follow?up phases.

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 or conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable feature 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.

3.6.5 Definable Feature of Work: Definition and Discussion

A Definable Feature of Work (DFW) is a portion of work consisting of materials, equipment, supplies and procedures which are closely related to each other, have the same control and will be accomplished by the same work crew to completion. A DFW must be sufficiently small so that control of the work (i.e. communication of requirements to workers, inspection of materials and workmanship and correction of deficiencies) will be easily accomplished. Some examples for various types of projects are:

* Concrete reinforcement and formwork

* Concrete mixing, placement, curing and finishing

* Testing Procedure for contaminated soil, materials and storage tank contents

* Storage Tank disassembly and removal

* Setting up of decontamination area, exclusion zones and standard safety procedures for asbestos removal

* Asbestos removal and disposal procedures

* Chemical Data Acquisition

* Preparation, removal and disposal of contaminated material

* Dredging and placement.

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 laboratory which has been assurance inspected by the Corps of Engineers within the last two years. 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, will 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 will 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 off site or commercial test facility will 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 and calibration 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, aggregate and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329. The Government requires a Corps of Engineers capability check of the laboratory which the contractor proposes to perform tests on soils, concrete, asphalt, aggregate and steel. If the laboratory proposed has not had the required Corps of Engineers capability check within the last two years, it will be performed by the Corps of Engineers at a cost of $7200 to the contractor. This cost will be paid by the Contractor via check directly to the Corps of Engineers Laboratory performing the inspection and report.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will

be assessed a charge of $7200 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory.

3.7.3 On-Site 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 will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, as designated by the Government Representative. 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's "Pre-final" inspection.

3.8.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is ready to be occupied. A Government "Pre-final Punch List" will 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 and so notify 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 will 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 will be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final

Inspection. Notice will 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 acceptable, 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 entitled "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. "N/A" shall be entered into any field for which no entry is intended. 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 16 hours after the date(s) 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 seven 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. All documentation is expected to be literate, legible and complete.

3.10 SAMPLE FORMS

(Note: If the Quality Control System (QCS) (formally called Resident Management System (RMS)) is required to be used by the contractor for the QC System as indicated elsewhere in this contract, Contractor will generate all reports in the QCS System, and attached forms will serve as guidance only. Otherwise forms contained herein will be used by the CQC Staff for CQC System reporting).

a. The 2-page form at the end of the section will be used for the basic CQC Report. CQC personnel shall attach continuation sheets as required for any entries which cannot fit on the basic form. Preparatory and Initial Inspections, when performed, shall be indicated on the basic CQC report and minutes for each inspection shall be attached. Minutes will consist of a list of specific requirements for materials, procedures or equipment to be employed and shall also include any understandings reached or items of special importance discussed.

b. In addition, outstanding deficiencies shall be listed on the form "List of Outstanding Deficiencies" at the end of this section and shall be attached to each CQC report. As deficiencies are corrected, they are to be acknowledged on the basic CQC report and shall be deleted from the list.

c. Form at the end of this section entitled "CQC Test Report List" shall be used by the Contractor to track testing to be done as the project progresses, and also to summarize the Contractor's Quality Control testing to be reported on the CQC Plan.

d. Form "Record of Preparatory and Initial Inspections" at the end of this section shall be used by the Contractor to track Preparatory and Initial inspections as the project progresses and also to summarize these required inspections as part of the CQC Plan.

e. Additional reporting forms pertaining to specialized activities may be included herein or elsewhere in the contract, and shall be used for reporting as indicated.

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. Deficiencies cited and verbal instructions given to the

Contractor by the Government Representative shall be entered into that day's CQC Report.

(FORMS FOLLOW)

-- End of Section --

RECORD OF PREPARATORY AND INITIAL INSPECTIONS

DATE OF INSP	TYPE OF INSP	DEFINABLE FEATURE OF WORK (DESCRIBE)	REPORT NOS		PERSONS ATTENDING INSP	WAS MATL&/OR EQUIPMENT PHYSICALLY INSPECTED ?
			QA	QC		

NAD FORM 826
22 JULY 86

NOTE:THIS FORM SHALL BE USED BY THE CONTRACTOR TO TRACK PREP/INIT INSP'S
ATTACH ADDITIONAL RESULTS OR COMMENTS AS REQUIRED

LIST OF OUTSTANDING DEFICIENCIES

SH_____ OF _____ DATE:_____

PROJECT TITLE:_____ CONTRACTOR:_____

LOCATION:_____ CQC REPORT#_____ CONTRACT #:_____

SPEC REF OR DWG#	LOCATION ON PROJECT	DESCRIPTION OF DEFICIENCY	DATE FOUND	DATE TO BE CORRECTED	DATE CORRECTED	REMARKS

NOTE: THIS FORM SHALL BE USED BY THE CONTRACTOR TO TRACK OUTSTANDING CONSTRUCTION DEFICIENCIES

CQC TEST REPORT LIST

CQC REPORT#_____ SH_____ OF _____ DATE:_____

CONTRACTOR:_____ CONTRACT #:_____

PROJECT TITLE:_____ LOCATION:_____

SPEC REF OR DWG#	TYPE OF TEST	DATE PERFORMED	RESULTS	REMARKS

NOTE: THIS FORM SHALL BE USED BY THE CONTRACTOR TO TRACK CQC TESTING.PROVIDE ATTACHMENTS AS REQUIRED.

CQC REPORT #_____ Date_____

1. Project Title:_____

Location: _____Contract No.:_____

2. List Contractors and Subs Working This Day and Areas of responsibility of each

_____

_____

_____

_____

3. Weather:

_____

_____

4.Description and Location of Work of the Project (Also indicate days of no work and reasons for delay)

_____

_____

_____

_____

_____

_____

5. Labor and Equipment Breakdown by Trade (Attach Continuation)

_____

_____

_____

_____

6. Preparatory Phase Inspections Held (See Attached Minutes)

_____

_____

_____

_____

_____

7. Initial Phase Inspections Held (See attached minutes)

_____

_____

_____

_____

_____

_____

8. Follow-Up Phase Inspections Performed, Results and Corrective Actions Taken

_____

_____

_____

_____

_____

_____

9. Job Safety. Indicate What Was Checked, Results,Instructions Received and Corrective Actions:

_____

_____

_____

_____

_____

_____

10. Additional Activities and Remarks (Check Appropriate Box)

[ ] a. Testing Performed. Attach Results.
[ ] b. Verbal Instructions Received.
[ ] c. Submittal Actions.
[ ] d. Outstanding Deficiencies. See Attached List
[ ] e. Delivery of Equipment and Materials.
[ ] f. Misc/Remarks.

(Use Space Below To Discribe Checked Items)

_____

_____

_____

_____

_____

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_____

_____

11. Contractor's Verification: "The above report and attachments are complete and all supplies, Materials, Equipment and Workmanship incorporated into the work are in full compliance with the contract except as noted".

Signed_____ Date_____

CQC Representative

CENAN-CO 5/99

SECTION 01453

CONTRACTOR WARRANTY MANAGEMENT

PART 1 GENERAL

1.1 REFERENCES

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

FEDERAL ACQUISITION REGULATIONS (FARS)

FAR 52.246-0021	Clause 'Warranty of Construction'
FAR 52.246-12	Clause 'Inspection of Construction'

OTHER SPECIFICATION REFERENCES

Record Drawings	"Record Drawings" paragraph from the Special Requirements Spec Section.
Contractor Quality Control	Specification Section entitled "Contractor Quality Control".

1.2 SUBMITTALS

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

SD-11 Close Submittals

Warranty Plan; G, RO

Within 10 days of the 80% completion point of this contract (or deliverable phase thereof), the contractor shall submit a warranty plan.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 WARRANTY OF CONSTRUCTION

Warranty of Construction. Per referenced FAR Clause "Warranty of Construction" above all construction shall be warranted against defects for a one-year period beginning at the project acceptance point. In addition, there may be equipment, systems or items for which labor and/or materials are warranted beyond the one year point. These are extended warranty items. In order to insure that the Government systematically receives all warranties of construction, equipment and systems to which it is entitled, the contractor shall execute all actions as required by above references and as contained herein. The contractor shall not be permitted

to claim improper and/or lack of maintenance as a reason to abdicate its responsibility to correct a warranty or latent defect items if the contractor is not in contract compliance pursuant to submission of O&M Manuals and /or maintenance instructions as required by references indicated in paragraph 4. or elsewhere in this contract.

3.2 TAGGING OF EXTENDED WARRANTY ITEMS

The Contractor shall install tags to identify items protected by extended warranty. The tags shall be minimum 3 inches by 5 inches in size, machine-printed in minimum 14-point type, and shall be weatherproof and oil resistant. Tags shall be attached to equipment if accessible or to accessible control panel, etc. As a minimum, tags shall indicate the following information:

"Extended Warranty Item:"
Name of Item
Name of System with which associated, number designation within system, or other identifier
Model Number
Serial Number
Start and end Dates of Warranty
Contract number
Contract Name
Contractor Name
Warranty Point of Contact name, organization and telephone number.
Warranty response time priority code
"WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD."

Contractor shall install additional tags on all equipment and systems where required for reasons of safety, maintenance, and prevention of damage.

3.3 POSTING OF INSTRUCTIONS

In addition to any posting of operating procedures as may be required elsewhere in this contract, any equipment or system for which proper operation or maintenance is critical in order to preserve warranties, prevent damage, or for reasons of safety shall have proper operating procedures and a Summarized Schedule of Maintenance Instructions posted near the equipment, system or near the operating point. The summarized schedule of Maintenance Instructions shall be inclusive and specific regarding all system components, indicate frequency of maintenance for each maintenance item, and briefly describe each maintenance procedure and cross-reference the volume and page number of the O&M Manual that details the maintenance procedure. Training shall include review of the Summarized Schedule of Maintenance Instructions and O&M Manual cross-references. Instructions shall be protected by 1/16 inch thick plastic sheet. As a minimum such equipment or system shall include:

Electrical Substations
Transformers
Electrical Generators
Major HVAC System components including chillers, air-handlers, fans, etc.
HVAC Control Panel
Boilers
Air Compressors

3.4 WARRANTY PLAN

Within 10 days of the 80% completion point of this contract (or deliverable phase thereof), the contractor shall submit a warranty plan for Government approval per section "Submittals". The Warranty Plan shall include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The plan shall be signed by a principal of the contractor. All documents in the plan shall be assembled in a binder. Upon acceptance it shall be signed by a Government Representative. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. As a minimum the plan shall indicate:

a. Roles and responsibilities of all personnel associated with the warranty process, including
points of contact and telephone numbers within the organizations of the contractor's, subcontractors or suppliers involved. This shall cover both the one year warranty of construction and extended warranty items or systems.

b. Listing and status of O&M manuals and As-built drawings, and expected delivery dates.

c. Listing and status of all training to be provided to Government personnel, whether specified by contract or required by manufacturers. Indicate dates of training both planned and accomplished.

d. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.

e. A spreadsheet-type list for each warranted equipment, item, feature of construction or system, to include roofs, HVAC components, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc., as applicable. For each item, the list shall indicate the following information:

Name of item
Model and serial numbers.
Location where installed
Names of manufacturers or, suppliers and phone numbers.
Names addresses and telephone numbers of sources of spare parts
Identification of Warranted materials and labor, and other terms warranty.
Cross-reference to warranty certificates as applicable.
Starting point and duration of warranty period.
Summary of maintenance procedures required to continue the warranty in force.
Cross-reference to specific pertinent Operation and Maintenance manuals
Organization, names and phone numbers of persons to call for warranty service
Typical response time and repair time expected for various warranted equipment

f. List of spare parts supplied and/or recommended by manufacturer for each piece of equipment.

g. The contractor's acknowledgement of intention to attend the Four and Nine month post-construction warranty inspections conducted by the Government.

h. Status of tagging of all equipment covered by extended warranties.

i. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons

j. Contractor's understandings with respect to warranty responsibilities for the one year overall warranty of construction, and expected performance on warranty calls during this period.

3.5 WARRANTY MEETING

Within 10 days after the approval of the Warranty Plan the contractor will notify the Government representative for the purpose of scheduling a meeting to clarify understandings of responsibilities with respect to warranties to which the Government is entitled. The Government and contractor shall attend the warranty meeting, as well as any subcontractors, or suppliers involved in the warranty process. The Warranty Plan shall be the basis of the meeting's agenda. Contractor will prepare minutes of the meeting indicating major understandings reached, and submit for Government approval within 3 days of the meeting. Minutes will be signed by authorized representatives of the Contractor and Government.

3.6 WARRANTY REQUIREMENTS COMPLIANCE

Expected performance of the Contractor on warranty work is indicated herein. If Contractor performance on a warranty call is unsatisfactory, the Contracting Officer may authorize the use of funds remaining in the contract to accomplish the warranty work on an expedited basis including the cost of Government administrative expenses. Repeated poor performance may result in retaining any payment due the Contractor until after the warranty of construction period. The Contractor's Performance Bond shall remain effective through the contract-specified warranty period. Poor warranty performance may also result in a poor contractor performance rating being entered into the Government CCASS system, or downward revision of such rating if already entered.

3.7 WARRANTY PERFORMANCE

Expected Response to Construction Warranty Service Requests and Completion of Repairs: Following oral or written notification by the Contracting Officer, the Contractor shall respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. The Contractor shall submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed.

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Air Conditioning Systems
(1) Recreational support.
(2) Air conditioning leak in part of building, if causing damage.
(3) Air conditioning system not cooling properly.

Code 1-Doors
(1) Overhead doors not operational, causing a security, fire, or safety problem.
(2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors
(1) Overhead doors not operational.
(2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical
(1) Power failure (entire area or any building operational after 1600 hours).
(2) Security lights
(3) Smoke detectors

Code 2-Electrical
(1) Power failure (no power to a room or part of building).
(2) Receptacle and lights (in a room or part of building).

Code 3-Electrical
Street lights.

Code 1-Gas
(1) Leaks and breaks.
(2) No gas to family housing unit or cantonment area.

Code 1-Heat
(1). Area power failure affecting heat.
(2). Heater in unit not working.

Code 2-Kitchen Equipment
(1) Dishwasher not operating properly.
(2) All other equipment hampering preparation of a meal.

Code 1-Plumbing
(1) Hot water heater failure.
(2) Leaking water supply pipes.

Code 2-Plumbing
(1) Flush valves not operating properly.
(2) Fixture drain, supply line to commode, or any water pipe leaking.
(3) Commode leaking at base.

Code 3 -Plumbing

Leaky faucets.

Code 3-Interior
(1) Floors damaged.
(2) Paint chipping or peeling.
(3) Casework.

Code 1-Roof Leaks
Temporary repairs will be made where major damage to property is occurring.

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

Code 2-Water (Exterior)
No water to facility.

Code 2-Water (Hot)
No hot water in portion of building listed.

Code 3-All other work not listed above.

3.8 POST-COMPLETION INSPECTIONS

The Government conducts project inspections for purposes identifying warranted deficiencies at the four and nine month points after project acceptance. The Contractor is required to attend these inspections in order to better manage any warranty items for which it may be responsible.

-- End of Section --

SECTION 01502

STREAM DIVERSION AND DEWATERING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Permanent Work

All work shall be carried on in areas free from water. The Contractor shall design, construct and maintain all necessary temporary coffer dams and other protective measures, shall make provisions for diversion of the stream, shall furnish and place all materials therefore, and shall furnish, install, maintain and operate all necessary pumping and other equipment for dewatering the various parts of the work. The Contractor shall be solely responsible for the safety of the work. All temporary protective works shall be removed before acceptance of the work under this contract.

1.2 PROTECTIVE MEASURES

1.2.1 Contractor Proposal

The Contractor shall prepare a method and design that generally describes the proposed protective measures. This shall be submitted to the Contracting Officer for approval prior to execution. However, the approval of the Contracting Officer shall not relieve the Contractor from full responsibility for the adequacy of the protective measures. Any damage to any part of the work shall be repaired as stipulated in the Special Contract Requirements and Contract Clauses.

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

Proposed Protective Measures; G, RO

Method and design generally describing the proposed protective measures.

-- End of Section --

SECTION 02218

MONITORING OF EXISTING STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all labor, materials, and equipment for performing all operations required to monitor existing structures.

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Qualifications of Surveyor; G, RO

Qualifications, with verification of experience and license number, of a Licensed Surveyor, registered in the State of New Jersey, with at least 10 years current experience in the monitoring of structures. Included in this submission shall be a listing, description, and references with phone numbers, of the current structural monitoring projects by this Surveyor.

Monitoring Existing Structures for Movement; G, RO

A comprehensive plan for monitoring of structures within 100 feet of the bulkhead installation including, but not limited to, the type of monitoring equipment to be used, the methods for measuring movement, and the frequency and schedule for taking readings shall be prepared and submitted by the Licensed Surveyor, specified above. The equipment shall have an ability to measure to 0.01 foot accuracy. An assessment of the existing structures within 100 feet of the new bulkhead will be made to determine if seismographs or other vibration monitoring equipment will be required due to pile driving of the sheet piling. If seismographs are needed, a plan will be submitted to include the number and locations of the seismographs within the contract area.

Monitoring of Existing Structures;

Through still and video photography, the conditions of all structures within 100 feet of the bulkhead installation shall be documented before the start of the contract work. After the completion of the contract work, the Contractor shall again document the conditions of these structures through still photography and videography. These photos and videos shall be, at a minimum, obtained at those locations where the initial documentation was made.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 MONITORING FOR MOVEMENT

The Contractor's Licensed Surveyor shall monitor existing structures for any type of movement during construction. The Surveyor shall be licensed and qualified as specified in paragraph SUBMITTALS, above. Survey points shall be installed on the structures. Coordinates and elevations of those points shall be established for those structures. The monitoring shall be done using approved monitoring devices during construction. The log of readings taken shall be provided daily with the Quality Control Report. The structures shall be monitored until the new bulkhead is backfilled and grading is completed.

-- End of Section --

SECTION 02220

DEMOLITION

Item Number 2: Demolition

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes removal and salvage of identified structures, utilities and facilities to indicated limits, and removal of resulting debris and rubbish. Structures, utilities, and facilities specifically identified on the drawings as scheduled for demolition are: concrete structures (including retaining walls and foundations), concrete sidewalk, block or brick walls and retaining walls, timber pilings or bulkhead, wood or timber structures, pavement, chain link fence, guiderail, streetlights, utility poles, traffic signals, and a section of a concrete block garage that is to be rebuilt. Rubbish and debris shall be removed from Project 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.

The location of utilities should be confirmed with the utility authority listed under subparagraph UTILITES.

1.2 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	(2003) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

Work Plan; G, RO

The plan shall include 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. 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, may be allowed to remain standing without additional bracing, shoring, or lateral support until demolished. 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.

1.5.2 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.

1.5.3 Protection From the Weather

The interior of buildings to remain and salvageable materials and equipment shall be protected from the weather at all times.

1.5.4 Protection of Trees

The Contractor shall protect existing trees marked to be preserved on the

plans during the life of this Contract using the methods described in Section 01410 ENVIRONMENT PROTECTION. 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.

1.5.5 Environmental Protection

The work shall comply with the requirements of Section 01410.

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.

1.8 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available with receipt of Notice-to-Proceed.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXISTING STRUCTURES

Existing structures indicated shall be removed to 1'0" feet below grade. Basement slabs shall be broken up to permit drainage. Other structures, utilities, and facilities identified on the drawings shall be removed as indicated on the drawings and according to the requirements herein.

3.2 EXISTING BULKHEAD

Existing bulkhead marked for demolition within the wetland creation limits will be cut to the elevations shown on the plans and removed.

3.3 UTILITIES

It is the Contractor's responsibility to detect and protect existing utilities (to remain) from damage during construction, as well as coordinate disconnection of utility services as necessary. Between 2 and 10 working days prior to start of construction, not including the day of the call, the Contractor is required to notify:

New Jersey One Call

399 Hoes Lane
Piscataway, 08854
Phone # 1-800-272-1000
Fax #732-394-3002

Movement of construction machinery and equipment over pipes and utilities to remain during construction shall be at the Contractor's risk. If a utility is inadvertently damaged, it shall be the Contractor's responsibility to restore that utility to operating condition, equal to that existing prior to damage. The Contractor shall remain at the site with

the damaged utility until it has been restored and there is no danger to the public (i.e. exposed live electrical wires, etc.). Should the Contractor need to cut off utilities or services during the performance of the work, the County Department, City Department or Utility Company owning or controlling services shall be notified and requested to cut off these services. Any services cut off or interrupted by the Contractor's operations shall be restored at the Contractor's expense.

Any work adjacent to non-Government utilities shall be performed as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within 2 feet of known Government-owned utilities or subsurface construction.

For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavation shall be done by hand. Hand excavation shall be started on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Uncovered lines or other existing work affected by the Contract excavation shall be supported until approval for backfill is granted by the Contracting Officer. Damage to utility lines or subsurface construction shall be reported immediately to the Contracting Officer.

The Contractor shall remove only the existing utilities indicated on the plans. When utility lines are detected and/or encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

3.4 FILLING

Holes, open basements, excavation required for demolition, and other hazardous openings shall be filled with select granular material (SECTION 02222).

3.5 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.

3.5.1 Salvageable Items and Material

Contractor shall salvage items and material to the maximum extent possible.

3.5.1.1 Material Salvaged for the Contractor

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from the site before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

3.5.2 Unsalvageable Material

Debris materials shall be disposed on a segregated basis. No materials shall be disposed at sea. Materials shall be disposed of off site, at approved landfills, in accordance with all Federal, State and local regulations.

3.6 CLEAN UP

Debris and rubbish shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

-- End of Section --

SECTION 02227

EXCAVATION OF NON-HAZARDOUS MATERIAL ABOVE MEAN HIGH TIDE

Item Number 37: Excavation and Transport of Non-hazardous Material
Item Number 38: Treatment and Disposal of Non-hazardous Material

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work described under this section relates only to materials excavated above mean high tide.

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to excavate, load, haul, treat and dispose of non-hazardous material as specified herein. Non-hazardous material is classified as all material located and/or excavated from above Mean High Tide (MHT) that can pass through a wire mesh screen with openings measuring 6 inches x 6 inches.

1.2 PUBLICATION

Pertinent information in the following publication shall also be followed in performing work specified in this section:

1. RCRA, 40 CFR, Part 261.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

All work under this section shall be executed in accordance with both the Site Safety and Health Plan and Work Plan submitted under Section 01351 SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW/UST).

3.1 EXCAVATION AND TRANSPORT OF NON-HAZARDOUS MATERIAL

Excavation and transport of non-hazardous materials shall be completed in conformance with all applicable state and federal requirements. Transport of non-hazardous material shall be performed in accordance with Section 00800 SPECIAL CONTRACT REQUIREMENTS, and as detailed below in paragraph TREATMENT AND DISPOSAL OF NON-HAZARDOUS MATERIAL.

3.2 TREATMENT AND DISPOSAL OF NON-HAZARDOUS MATERIAL

Treatment and disposal of non-hazardous material excavated from above mean high tide, including the resulting solids output, shall be completed in conformance with all applicable state and federal requirements.

-- End of Section --

SECTION 02222

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

Item Number 4a: Trench Excavation, 15-Inch Diameter RCP
Item Number 4c: Trench Excavation, 36-Inch
Item Number 4d: Trench Excavation, 60-Inch
Item Number 4f: Trench Excavation, 84-Inch
Item Number 4h: Trench Excavation, 7' by 9' RC Culvert
Item Number 4i: Trench Excavation, 5.5' by 8.5' RC Culvert
Item Number 9a: Bedding Material
Item Number 10: Unclassified Excavation

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary for excavation, foundation (bottom) preparation, backfilling and compaction for installation of storm-drain facilities as specified herein.

1.2 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 422	(1963; R 2002) Standard Test Method for Particle-Size Analysis of Soils
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.3 DEFINITIONS

1.3.1 Degree of Compaction

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

1.4 SUBMITTALS

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

SD-06 Test Reports

Field Density Tests; G, RO

Testing of Backfill Materials; G, RO

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

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Satisfactory Materials

Satisfactory materials shall consist of any material classified by ASTM D 2487 as SP, SM, ML, CL, GM, GW, GP, and SW.

2.1.2 Unsatisfactory Materials

Unsatisfactory materials shall be materials that do not comply with the requirements for satisfactory materials. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than 3 inches, and materials classified in ASTM D 2487, as MH PT, OH, and OL. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

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 include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

2.1.4 Rock

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

2.1.5 Unyielding Material

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

2.1.6 Unstable Material

Unstable material shall consist of materials too wet to properly support the pipe, or structures.

2.1.7 Bedding Material

Bedding material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a No. 200 mesh sieve and no less than 85 percent by weight passing the 1/2-inch sieve. The maximum allowable aggregate size shall be 1/2 inch, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

2.1.8 Initial Backfill Material

Initial backfill shall consist of bedding material or satisfactory 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.

PART 3 EXECUTION

3.1 EXCAVATION

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

Soil reuse for non-hazardous soil material exceeding NJDEP Soil Cleanup Criteria must be coordinated with the NJDEP. Testing of unclassified materials to be excavated and removed from the site should be coordinated with the NJDEP Division of Solid and Hazardous Waste, Bureau of Landfill and Recycling Management and the recycling or disposal facility chosen to accept the material. The test results for soil test holes should be used only as a reference due to the time which has expired since sampling was conducted, and the difference in location of the sampling holes to the location of the unclassified materials to be excavated.

The Contractor shall be responsible for conducting a soil analysis test of excavated material for levels of semi-volatile, volatile organic compounds

and trace metal. The excavated material shall be stored on-site under tarp until the test results have been analyzed and an appropriate use determination has been made. Test results should be submitted to the Corps Environmental Analysis Branch POC as well as the NJDEP and the proposed landfill or processing facility.

All river sediment material excavated on-site shall be placed in water-tight containers on-site to be removed for disposal. The Contractor shall provide the containers. The Contractor shall cover the containers when not in use to prevent rain water from entering. The containers shall also be transportable in the event of a flood.

3.1.1 Trench Excavation

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 4 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 4 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. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.1.1 Bottom Preparation

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

3.1.1.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 6 inches below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.1.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with the bedding material as provided in paragraph BACKFILLING AND COMPACTION. 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.

3.1.1.4 Excavation for Appurtenances

Excavation for inlets, junction chambers or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.1.5 Stockpiles

Stockpiles of satisfactory and unsatisfactory and wasted materials shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government. Locations of stockpiles of satisfactory materials shall be subject to prior approval of the Contracting Officer.

Soil material excavated shall be tested for chemical constituents to determine the suitability of the material for re-use as backfill or to determine the proper disposal of the material at an approved landfill. The Contractor shall be responsible for conducting a soil analysis test for semi-volatile, volatile organic compounds and trace metals. The excavated material shall be stored on-site in water-tight containers until the test results have been analyzed and an appropriate use determination has been made. The containers shall be provided by the Contractor. The Contractor shall cover the containers when not in use to prevent rain water from entering. The containers shall also be transportable in the event of a flood. Stockpiles of satisfactory bedding material shall be placed and graded as specified. Soil reuse for non-hazardous soil material exeeding NJDEP Soil Cleanup Criteria must be coordinated with the NJDEP. Testing of unclassified material to be excavated and removed from the site should be coordinated with the NJDEP Division of Solid and Hazardous Waste, Bureau of Landfill and Recycling Management and the recycling or disposal facility chosen to accept the material. Test results should be submitted to the Corps Environmental Analysis Branch POC as well as the NJDEP and the proposed landfill or processing facility.

All river sediment material excavated on-site shall be placed in water-tight containers on-site to be removed for disposal. The Contractor shall provide the containers. The Contractor shall cover the containers when not in use to prevent rain water from entering. The containers shall also be transportable in the event of a flood.

3.2 BACKFILLING AND COMPACTION

Backfill material shall consist of satisfactory material, bedding material, or initial backfill material as required. Backfill shall be placed in

layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for cohesionless soils and 90 percent maximum density for cohesive soils, unless otherwise specified.

3.2.1 Trench Backfill

Trenches shall be backfilled to the new grade shown.

3.2.1.1 Replacement of Unyielding Material

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

3.2.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with bedding material placed in layers not exceeding 6 inches loose thickness.

3.2.1.3 Bedding and Initial Backfill

Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the pipe. 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, railroads and airfields, shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

Backfill shall be deposited in layers of a maximum of 12 inch loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted.

3.2.2 Backfill for Appurtenances

After the inlets, junction chambers, or similar structures have been constructed, backfill shall be placed in such a manner that the structures will not be damaged by the shock of falling material. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structures to prevent eccentric loading and excessive stress.

3.3 TESTING

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

3.3.1 Testing Facilities

Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. No work requiring

testing will be permitted until the facilities have been inspected and approved by the Contracting Officer. 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.

3.3.2 Testing of Backfill Materials

Characteristics of backfill materials shall be determined in accordance with particle size analysis of soils ASTM D 422 and moisture-density relations of soils ASTM D 1557. A minimum of one particle size analysis and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3.3.3 Field Density Tests

Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one field density test per lift of backfill for every 50 feet of installation shall be performed.
One moisture density relationship shall be determined for every 1500 cubic yardsof material used. Field in-place density shall be determined in accordance with ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using the sand cone method as described in paragraph Calibration of the ASTM publication. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. Copies of calibration curves, results of calibration tests, and field and laboratory density tests shall be furnished to the Contracting Officer. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

-- End of Section --

SECTION 02226

EXCAVATION OF CONTAMINATED RIVER SEDIMENT MATERIAL FROM BELOW MEAN HIGH TIDE

Item Number 12: Excavation and Transport of Contaminated Material
Item Number 13: Treatment and Disposal of Contaminated Material

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work described under this section relates only to materials excavated below mean high tide.

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to excavate, load, haul, treat and dispose of contaminated material as specified herein. Contaminated material is classified as all material located and/or excavated from below Mean High Tide (MHT) that can pass through a wire mesh screen with openings measuring 6 inches x 6 inches. The work shall be performed in compliance with the requirements of the Federal Consistency Determination/Water Quality Certification.

1.2 PUBLICATIONS

Pertinent information in the following publications shall also be followed in performing work specified in this section:

1. The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters, dated October 1997.
2. RCRA, 40 CFR, Part 261.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

All work under this section shall be executed in accordance with both the Site Safety and Health Plan and Work Plan submitted under Section 01351 SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW/UST).

3.1 EXCAVATION AND TRANSPORT OF CONTAMINATED MATERIAL

Excavation and transport of contaminated materials shall be completed in conformance with all applicable state and federal requirements. Transport of contaminated river sediment material shall be by covered watertight container trucks or barges as detailed under Section 00800 SPECIAL CONTRACT REQUIREMENTS, in paragraph BARGES FOR CONTAMINATED RIVER SEDIMENT MATERIAL EXCAVATED FROM BELOW MEAN HIGH TIDE.

3.2 TREATMENT AND DISPOSAL OF CONTAMINATED MATERIAL

Treatment and disposal of contaminated river sediment material excavated from below mean high tide, including the resulting solids output, shall be completed in conformance with all applicable state and federal requirements.

-- End of Section --

SECTION 02230

CLEARING AND GRUBBING

Item Number 1: Clearing and Grubbing

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary for clearing and grubbing designated areas, and satisfactory disposal of materials as specified herein.

The Contractor shall carefully protect all preserved trees as shown on the plans, and shall also be liable for any and all damages to property caused by the work under this section. Any damages to property or to trees to be preserved shall be replaced or restored to the original conditions to the satisfaction of the Contracting Officer at no additional cost to the Government.

1.2 DEFINITIONS

1.2.1 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 downed timber, snags, ground vegetation, vines, and brush occurring in the areas to be cleared as shown on the plans. All objectionable material including stones, boulders, tires, trash, and any other debris as directed by the Contracting Officer shall also be cleared. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work as directed by the Contracting Officer. This material shall be removed from within the limits of the clearing areas in accordance with the plans and specifications, and the direction of the Contracting Officer.

1.2.2 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.

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 or preserved. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1 1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or

directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. 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 directed by the Contracting Officer. Trees designated to be preserved shall not be trimmed, and shall be protected as described in Section 01410 ENVIRONMENT PROTECTION, paragraph 3.1.

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 structures, 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 DISPOSAL OF MATERIALS

3.3.1 Disposal

Logs, stumps, roots, brush, rotten wood, tires, trash, and other debris from the clearing and grubbing operations shall be disposed of outside the limits of the Project at approved landfills and in accordance with all federal, state, and local regulations. The Contracting Officer may direct the Contractor to chip cleared logs, stumps, roots, brush for use as organic material for soil amendments.

-- End of Section --

SECTION 02233

DENSE-GRADED AGGREGATE BASE COURSE

Item 39: Aggregate Base Course for Overlook

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29	(1997) Unit Weight and Voids in Aggregate
ASTM C 88	(1999) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	(2003) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(2001) Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2001e1) Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(2003) Sampling Aggregates
ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002) Laboratory Compaction

	Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(2001) Wire-Cloth Sieves for Testing Purposes
ASTM E 548	(1994) General Criteria Used for Evaluating Laboratory Competence

1.3 SUBMITTALS

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

SD-03 Product Data

Graded-crushed Aggregate Base Course; G, RO

Submit product data 30 days before start of work.

Equipment; G, RO

Submit a list of proposed equipment to be used, including descriptive data, at least 3 days prior to starting work.

SD-06 Test Reports

Sampling and Testing; G, RO

Submit calibration curves and related test results prior to using the device or equipment being calibrated. Submit copies of field test results within 24 hours after the tests are performed. Submit certified copies of test results not less than 30 days before material is required for the work.

SD-13 Records

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all aggregates actually used.

1.4 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.4.1 Graded-crushed Aggregate

Graded-crushed aggregate (GCA) is a well-graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction. A GCA base course is similar to a regular aggregate base course, but it has more stringent requirements and it produces a base course with higher strength and stability.

1.4.2 Degree Of Compaction

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557. This will be abbreviated herein-after as percentage of laboratory maximum density.

1.5 EQUIPMENT

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls and thickness control requirements as set forth herein.

1.6 Weather Limitations

Base courses shall be placed when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees Fahrenheit, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Areas of completed base course that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirement.

1.7 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory, or by the Contractor, subject to approval. If the Contractor elects to establish testing facilities of his own, approval of such facilities shall be based on compliance with ASTM E 548, and no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved. The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection will be at the expense of the Contractor. Such costs will be deducted from the total amount due the Contractor. The materials shall be tested to establish compliance with the specified requirements. Copies of test results shall be furnished to the Contracting Officer.

1.7.1 Sampling

Sampling for material gradation, liquid limit, and plastic limit tests shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.7.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.7.2.1 Sieve Analyses

Sieve analyses shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.7.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.7.2.3 Moisture-Density Determinations

The maximum density and optimum moisture content shall be determined in accordance with ASTM D 1557.

1.7.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 2922. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted if necessary using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed.

1.7.2.5 Wear Test

Wear tests shall be made on base course material in conformance with ASTM C 131.

1.7.2.6 Soundness

Soundness tests shall be made on base course material in accordance with ASTM C 88.

1.7.3 Testing Frequency

1.7.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Soundness.

1.7.3.2 In-Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted base course. Samples shall be taken and tested at the rates indicated.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Sieve Analysis shall be performed for every 500 tons, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

1.7.4 Approval of Material

The source of the material to be used for producing aggregate for base course shall be selected 30 days prior to the time the material will be required in the work. Tentative approval of the source will be based on an inspection by the Contracting Officer. Tentative approval of material will be based on tests of samples for the specific job. Final approval of both the source and the material will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted base course.

PART 2 PRODUCTS

2.1 AGGREGATES

The following dense-graded aggregate base course materials shall be used for subbbase construction:

2.1.1 GRADED-CRUSHED AGGREGATE BASE COURSE

Aggregate Base Course for Overlook shall be GCA base course. The GCA base course shall consist of clean, sound, durable particles of crushed stone, crushed gravel, angular sand or other approved material. GCA shall be free of silt and clay as defined by ASTM D 2487, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.2 OTHER AGGREGATE BASE COURSE

Other aggregate base course shall consist of clean, sound, durable particles of crushed stone, crushed slag, or crushed gravel, and screenings. The Contractor shall obtain materials that meet the specification and that can be used to meet the grade requirements specified herein, after all compaction operations have been completed. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than

65 pcf as determined by ASTM C 29. The aggregates shall be free of silt and clay (as defined by ASTM D 2487), vegetable matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.3 Coarse Aggregate

Coarse aggregate shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.

Coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. Coarse aggregate shall not exhibit a loss greater than 50 percent weighted average, at five cycles, when tested for soundness in magnesium sulfate in accordance with ASTM C 88. The amount of flat and elongated particles shall not exceed 20 percent for the fraction retained on the 1/2 inch sieve nor 20 percent for the fraction passing the 1/2 inch sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregate shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 90 percent of which by weight are retained on the maximum size sieve listed in TABLE 1 below.

2.1.4 Fine Aggregate

Fine aggregate shall consist of angular particles produced by crushing stone, slag, recycled concrete, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. Fine aggregate shall be of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.5 Gradation Requirements

Gradation requirements specified herein shall apply to the completed aggregate base courses. The aggregates shall have a maximum size of 1 1/2 inch(es) and be graded continuously well within the limits specified in TABLE I. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES FOR BASE COURSE

Sieve Designation	Percentage by Weight Passing Sieve
1-1/2 inch	100
3/4 inch	55-90
No. 4	25-60
No. 50	5-25
No. 200	3-12

NOTE 1: Particles having diameters less than 0.0008 inch shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.1.6 Liquid Limit and Plasticity Index

Liquid limit and plasticity index requirements stated herein shall apply to any aggregate component that is blended to meet the required gradation and also to the aggregate in the completed base course. The portion of the aggregate passing the No. 50 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

Any specific requirements of the sections in which base courses are constructed shall supercede the following requirements.

3.1 GENERAL REQUIREMENTS

When the subbase is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 PREPARATION OF UNDERLYING COURSE

Prior to constructing the dense-graded aggregate base course, the underlying course shall be cleaned of all foreign substances. At the time of construction of the base course, the surface of the underlying subgrade shall contain no frozen material. The underlying subgrade shall conform to Section 02300AEARTHWORK. Ruts or soft, yielding spots in the underlying subgrade, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. The finished underlying subgrade shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

3.3 GRADE CONTROL

During construction, the lines and grades, including crown and cross slope indicated for the base course, shall be maintained by means of line and grade stakes placed by the Contractor. The finished and completed base courses shall conform to the lines, grades, and cross sections shown on the plans. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished subbase with the subsequent surface course will meet the designated grades.

3.4 MIXING OF MATERIALS

The coarse and fine aggregates shall be mixed in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. The Contractor shall make such adjustments in mixing procedures or in equipment as may be directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to ensure a satisfactory base course meeting all requirements of this specification.

3.5 PLACING

The mixed material may be placed on the prepared subgrade with an approved spreader or front-end loader and bulldozer. The materials shall be placed in layers of uniform thickness. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall exceed 6 inches or be less than 3 inches when compacted. The layers shall be so placed that, when compacted, they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to ensure an acceptable base course.

3.6 COMPACTION

3.6.1 Requirements

Each layer of base course shall be compacted to produce an average field-measured density, through the full depth, of at least 95 percent of laboratory maximum density obtained in the laboratory. Water content shall be maintained during the compaction procedure such that the water content is within plus or minus 5 percent of optimum water content as determined from laboratory tests as specified in density test procedures listed in paragraph SAMPLING AND TESTING.

Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the base course material shall be compacted with mechanical tampers. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to

reduce or increase water content, and to ensure a satisfactory subbase. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.6.2 Finishing

The surface of top layer of base course shall be finished after final compaction, where required, by cutting any overbuild to grade and rolling with a steel-wheeled roller. In no case will thin layers of material be added to the top layer of base course to meet grade. If the elevation of top layer of base course is 1/2 inch or more below the grade, the top layer of base shall be scarified to a depth of at least 3 inches, new material shall be added, and the layer shall be blended and recompacted to bring to grade. Adjustments in rolling and finishing procedures shall be made as may be directed to obtain grades, to minimize segregation and degradation of base course material, to adjust the water content, and to insure an acceptable base course. Material found unacceptable shall be removed and replaced, as directed, with acceptable material.

3.7 EDGES OF BASE COURSE

Acceptable material shall be placed along the edges of the base course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1-foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the base course, as directed.

3.8 THICKNESS CONTROL

The completed thickness of the base course shall be within 1/2 inch of the thickness indicated. The thickness of the base course shall be measured at intervals providing at least one measurement for at least each 500 square yards of base course. The depth measurement shall be made by test holes at least 3 inches in diameter. Where the measured thickness of the base course is more than 1/2 inch deficient, such areas shall be corrected by excavating to the required depth and replacing with new material. Where the measured thickness of the base course is 1/2 inch more than indicated, it will be considered as conforming with the requirements plus 1/2 inch, provided the surface of the base course is within 1/2 inch of established grade. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness indicated.

3.9 TRAFFIC

Traffic shall not be allowed on the completed subbase. Heavy equipment shall not be permitted except when necessary for construction, and then the area shall be protected against marring or damage to the completed work.

3.10 MAINTENANCE

The base course shall be maintained in a condition that will meet all specification requirements until accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any area of subbase that is damaged shall be reworked or replaced as necessary to comply with this specification.

Any vegetation damaged by the work under this section, as determined by the Contracting Officer, shall be replaced immediately after the completion of the work at no additional cost to the Government.

3.11 RESTORATION AND CLEAN UP

When dense-graded aggregate base course operations have been completed, the Contractor shall restore any damaged areas to their original conditions.

Work areas shall also be cleaned up, including the removal of any excess materials. The Contractor shall remove damaged, excess, and waste materials from the Project Site and dispose of the materials off Government property.

-- End of Section --

SECTION 02275

FLOATING TURBIDITY BARRIER

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, and installing (as applicable) all material, labor, equipment, tools, and incidentals necessary to complete the work specified herein. The intent of the work under this section is to control siltation of excavated material into existing watercourses. Siltation control measures shall be constructed to the extent necessary to completely protect the water from siltation and environmental damage caused by the Contractor's operations. Construction methods and procedures shall be implemented to minimize siltation.

Floating turbidity barrier shall comply with NJDOT standards or with the standards specified herein.

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 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Floating turbidity barrier; G, RO

Submit product information 30 days prior to starting work.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Floating Turbidity Barrier

Materials for the floating turbidity barrier shall be as follows:

Curtain fabric: Bright color (yellow or orange) 10 mil thick polyethylene plastic or polyester reinforced vinyl sheets at least 22 ounces per square yard. Any seams shall be either vulcanized or sewn, and shall develop the full strength of the fabric.

Flotation devices: Flexible, buoyant units contained in an individual floatation sleeve or collar attached to the curtain. Buoyancy shall be sufficient to support the weight of the curtain and maintain a freeboard of at least 3 inches above the water surface level.

Top load line: Woven webbing or vinyl-sheathed steel cable, with a break strength in excess of 10,000 pounds, fabricated into the curtain fabric. Shall have suitable connecting devices that develop the full breaking strength for connecting to load lines in adjacent sections of the curtain.

Bottom/supplemental load line: Chain incorporated to the bottom hem of the curtain of sufficient weight to serve as a ballast to hold the curtain in a vertical position.

Floating anchor buoys: Flexible, buoyant unit of the same material as the floatation devices.

Bottom anchors: Grappling hook-, plow- or fluke-type (that digs into the bottom of the watercourse) or mushroom-type anchor (weighted) shall be used. Must be sufficient to hold the curtain in the same position relative to the bottom of the watercourse, without interfering with the action of the curtain.

End stakes: Stakes shall be 2 inch x 4 inch or 2 1/2 inch minimum diameter wooden stakes.

PART 3 EXECUTION

3.1 INSTALLATION

The Contractor shall take every precaution to stop soil sediment from leaving the work limits of the Contractor's work area. The precautions are subject to approval of the Contracting Officer and are not limited to floating turbidity barrier. Floating turbidity barrier shall be installed prior to any work being performed that could impact adjacent watercourse.

3.1.1 Floating Turbidity Barrier

Floating Turbidity Barrier shall be installed in streams or other watercourses to intercept sediments in the waterway in accordance with the plans and specifications, and as directed by the Contracting Officer. Floating turbidity barrier shall be located approximately 50 feet from the point of discharge of drainage pipes or from construction operations affecting the waterways.

The Contractor shall first install the end stakes and bottom anchors and associated anchor buoys. The end stakes shall be located well into the shoreline, above the mean high water line, so as to fully enclose the area were sediment may enter the watercourse, accounting for the ebb and flow of the tides. When the anchors are secure, the furled fence should be secured to the upstream end point and then sequentially attached to the next downstream anchor point until the entire curtain is in position and attached to the downstream end stake. Prior to unfurling, the lay of the fence should be assessed, and the anchors adjusted as necessary. The furling lines shall then be cut to allow the curtain to drop.

Anchor buoys shall be employed on all anchors to prevent the current from submerging the floatation device at the anchor points. Care shall be taken to ensure that anchor points are of sufficient holding power to retain the curtain into the water. An anchor line shall run from the top load line (never attached to the bottom of the curtain) to a floating anchor buoy to the associated bottom anchor. The manufacturer's recommendations shall be followed with regard to bottom anchor spacing. The top load lines must contain enough slack to allow the anchor buoy and curtain to float freely with tidal changes without being pulled down.

A minimum gap of 1 foot shall exist between the bottom of the curtain fabric and the bottom of the watercourse at mean low water.

The Contractor shall avoid an excessive number of joints in the curtain by using a minimum continuous span of 50 feet between joints. The floating turbidity barrier shall be installed using a maximum span of 100 feet between anchor or stake locations.

Standard small craft warning buoys, as approved by the Contracting Officer, shall be located along the fence at a minimum of 100-foot intervals.

The floating turbidity barrier is required to remain intact during the life of the Contract. The floating turbidity barrier shall be located as shown on the plans.

3.2 MAINTENANCE

The Contractor shall continuously maintain the integrity of the floating turbidity barrier, including providing all necessary labor, equipment, and materials, until earthwork construction is completed and permanent erosion control measures are in place. The Contractor shall inspect the floating turbidity barrier on a daily basis to ensure they are functioning properly and not entangled with debris. The Contractor shall also inspect the floating turbidity barrier immediately after each storm and at least daily during prolonged rainfall or tidal cycles to determine if the floating turbidity barrier is functioning as designed. The Contractor shall immediately correct any deficiencies. Should the floating turbidity barrier become damaged or otherwise ineffective while it is still necessary, the Contractor shall immediately repair or replace the defective or damaged floating turbidity barrier. Maintenance of the floating turbidity barrier should continue until permanent erosion and sediment control measures are in place, established, or stabilized to the satisfaction of the Contracting Officer.

3.3 REMOVAL AND DISPOSAL

The floating turbidity barrier shall remain in place as shown in the plans until the end of the Contract or until the Contracting Officer directs its removal. Upon removal, the Contractor shall restore the area as directed by Contracting Officer. The turbidity barrier materials shall become the property of the Contractor and be removed from the site. Any vegetation disturbed during floating turbidity barrier removal shall be replanted at no additional cost to the Government.

-- End of Section --

SECTION 02300A

EARTHWORK

Item Number 9b: Select Granular Material
Item Number 9c: Crushed Stone
Item Number 11: Borrow
Item Number 36: Wetland Subsoil

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary for excavation, borrow, and topsoil, and for preparation, backfilling, compacting, grading, and finishing associated with the work specified herein. The work also includes backfilling steel sheetpile bulkhead with select granular material.

1.2 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 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1140	(2000) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 2937	(2000el) Density of Soil in Place by the Drive-Cylinder Method

ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 5268	(2002) Topsoil Used for Landscaping Purposes

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

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

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, SW, SP, SM, GM, CL, ML. Satisfactory materials for grading shall be free from roots and other organic matter, trash, debris, and frozen materials and stones larger than 6 inches in any dimension.

1.3.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Materials classified in ASTM D 2487 as Pt, OH, and OL are unsatisfactory. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

1.3.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.3.4 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density except for compaction of wetland subsoil escept of compaction of wetland subsoil. Degree of compaction for wetland subsoil shall consist of 4 passes with the compaction equipment specified herein.

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 Preconstruction Submittals

Bathymetric and Topographic Survey; G, RO

Bathymetric and topographic survey shall be submitted 30 days prior to commencement of construction. The survey requirements shall be as indicated in Section 00800 SPECIAL CONTRACT REQUIREMENTS, paragraph No. 50 ADDITIONAL CONTRACTOR SURVEY REQUIREMENTS.

Delivered Wetland Subsoil; G, RO

Submit product information for delivered materials 30 days prior to starting work, including particle size and textural class.

Proposed source of borrow material.

SD-06 Test Reports

Testing; G, RO

Within 24 hours of conclusion of physical tests, 3 copies of test results, including calibration curves and results of calibration tests.

SD-07 Certificates

Testing

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

SD-04 Samples

Delivered Wetland Subsoil; G, RO

Submit samples taken from several locations at the source at least 15 calendar days prior to scheduled soil amendment delivery.

1.5 SUBSURFACE DATA

Subsurface soil boring logs are included in Section 00902 BORING LOGS. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.6 CLASSIFICATION OF EXCAVATION

All excavation shall be considered unclassified, with the exception of the following: 1) material excavated below Mean High Tide (MHT) that can pass through a wire mesh screen with openings measuring 6 inches by 6 inches,which will be classified as contaminated material and 2) material excavated above Mean High Tide (MHT) that can pass through a wire mesh screen with openings measuring 6 inches x 6 inches which will be classified as non-hazardous material. Requirements for excavation of contaminated materials are included in Section 02226 EXCAVATION OF CONTAMINATED RIVER SEDIMENT MATERIAL FROM BELOW MEAN HIGH TIDE. Requirements for excavation of non-hazardous materials are included in Section 02227 EXCAVATION OF NON-HAZARDOUS MATERIAL FROM ABOVE MEAN HIGH TIDE. Classification of materials required for utilities systems are included in Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

1.7 BLASTING

Blasting will not be permitted.

1.8 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of in designated waste disposal or spoil areas. Satisfactory material removed from excavations may be used, insofar as practicable, for trench backfill. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material authorized to be wasted shall be disposed of in designated areas approved for surplus material storage or designated waste areas, as directed. Newly-designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency, or appearance, of any structure, or be detrimental to the completed work in any way.

All material removed from excavations, both unsatisfactory and satisfactory material, will be disposed of in on-site water-tight containers that the Contractor shall provide. The Contractor will be responsible for removal of the containers and treatment or disposal of the material placed within the containers. The containers should be transportable in the instance of a flood event.

1.9 BATHYMETRIC AND TOPOGRAPHIC SURVEY

The Contractor shall be responsible for obtaining a bathymetric and topographic survey of the area described below prior to commencement of the work to confirm existing topography. The survey shall be performed by a licensed surveyor in the State of New Jersey. The Contractor shall be responsible for converting the survey data into an electronic file compatible with the Project's design plans to the satisfaction of the Contracting Officer. The survey information shall include: 1) the top of existing bulkhead from Station 60+00 to Station 70+00 and 2) topographic, bathymetric, and planimetric data for a 100-foot corridor centered on the bulkhead from Station 60+00 to Station 70+00. The topographic and bathymetric data shall be shown in ½-foot contours.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Select Granular Material

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

2.1.2 Crushed Stone

Crushed stone shall conform to No. 57 of the NJDOT Standard Specifications, Table 901-1.

2.2 Wetland Subsoil

Wetland Subsoil shall be as defined in ASTM D 5268. Wetland Subsoil shall consist of natural, friable soil and shall be reasonably free from underlying subsoil, clay lumps, objectionable weeds, viable plants and plant parts, slag, cinders, stones, lumps of soil, sticks, roots, brush, trash or other material over a minimum 1 1/2 inch diameter. Wetland Subsoil shall be free from toxic substances or any material that might be harmful to plant growth or be a hindrance to grading, seeding, planting or maintenance operations. Wetland Subsoil material shall be approved by the Contracting Officer.

PART 3 EXECUTION

The Contractor shall avoid any construction activities that may result in excess siltation of the Passaic River during the migration of anadromous and semi-anadromous fish species from April 1 to June 30.

Due to the low bearing capacity of the existing soils at the Project Site, the Contractor shall utilize specialized construction techniques and equipment with low ground contact pressure, such as vehicles with large tracks.

3.1 EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specifiedon the plans, including areas to be over-excavated. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to, and placed in, fill or embankment within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Such excavated material and the satisfactory material ordered as replacement shall be included in excavation. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage or designated waste areas. Unsatisfactory excavated material shall be disposed of in designated waste or spoil areas. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.

Soil material excavated shall be tested for chemical constituents to determine the suitability of the material for re-use as backfill or to determine the proper disposal of the material at an approved landfill. The Contractor shall be responsible for conducting a soil analysis test for semi-volatile, volatile organic compounds and trace materials. The excavated material shall be stored on-site under tarp until the test results have been analyzed and an appropriate use determination has been made.

All river sediment material excavated from on-site shall be placed in water-tight containers on-site to be removed for disposal. All excavated soil material shall also be stored on-site in water-tight containers in the interim of testing and final determination for reuse or transport off-site for disposal. The Contractor shall supply the containers. The Contractor shall cover the containers when not in active use to prevent rainwater from entering. The containers shall also be transportable in the event of a flood. Soil material excavated shall be tested for chemical constituents

to determine the suitability of the material for re-use as backfill or to determine the proper disposal of the material at an approved landfill. The Contractor shall be responsible for conducting a soil analysis test for semi-volatile, volatile organic compounds, and for trace metals.

3.1.1 Ditches, Gutters, and Channel Changes

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

3.1.2 Drainage Structures

Excavations shall be made to the lines, grades, and elevations shown, or as directed. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm, level, stepped, or serrated surface. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, the bottom of the excavation shall not be disturbed. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed. Where pile foundations are to be used, the excavation of each pit shall be stopped at an elevation 1 foot above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, loose and displaced material shall be removed and excavation completed, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.1.3 Trench Excavation

Trenches shall be excavated as shown on the plans. Trench walls shall be made vertical. Trench walls more than 5 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 5 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.

3.1.3.1 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 approved by the Contracting Officer. 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 at no additional cost to the Government.

3.2 OPENING AND DRAINAGE OF EXCAVATION

The Contractor shall notify the Contracting Officer 5 working days in advance of the opening of any excavation to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. The Contractor shall ensure that excavation of any area, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

The Contractor shall schedule work to coincide with advantageous low tide cycles. Excavation shall not proceed in areas which are inundated. Work shall proceed in only those areas during a time at which the areas are drained.

Material shall not be dewatered on site. Excavated material shall be stockpiled as specified in paragraph STOCKPILES and allowed to dry before hauling to the disposal area. Any wet material shall be carted in a watertight truck bed.

During construction, excavations shall be kept shaped and drained. The Contractor shall also provide for the collection and disposal of surface and subsurface water encountered during construction in upland areas. The Contractor shall drain the upland areas during periods of construction to keep soil materials sufficiently dry. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, the Contractor shall utilize the necessary measures to permit construction to proceed. It is the responsibility of the Contractor to assess the soil and groundwater conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.3 DEWATERING

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 1 feet below the working level.

3.4 GRADING AREAS

Where indicated, work will be divided into grading areas within which satisfactory excavated material shall be placed in embankments, fills, and required backfills. The Contractor shall not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing.

3.5 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and

compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph PREPARATION OF GROUND SURFACE. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraphs PREPARATION OF GROUND SURFACE and SUBGRADE, and Section 02720 STORM-DRAINAGE SYSTEM; and Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.6 STOCKPILES

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.

3.7 PREPARATION OF GROUND SURFACE

Ground surface on which fill is to be placed shall be stripped of vegetation, rubbish, debris, and other unsatisfactory material.

The Contractor shall protect the prepared surface from compaction or damage by vehicular or pedestrian traffic, as well as surface erosion.

3.8 SUBGRADE

3.8.1 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material, or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. The elevation of the finish subgrade shall not vary more than 0.05 foot from the established grade and cross section.

3.8.2 Compaction

Compaction shall be accomplished, unless indicated otherwise on the plans or directed by the Contracting Officer, by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Each layer of backfill shall be compacted to at least 95 percent of laboratory maximum density.

3.8.3 Protection

The finished subgrade shall not be disturbed by traffic or other operations and shall be protected and maintained by the Contractor in a satisfactory condition until subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted.

3.9 PLACEMENT OF SUBSOIL AND TOPSOIL

Subsoil and topsoil shall be placed to line, grade, and cross section as shown on the plans. After spreading, it shall be plowed, disked or otherwise broken up so that the fill will bond with the surface on which it is placed. Subsoil shall be compacted by passing over the area 4 times with 1 10,000-pound vibratory roller. Topsoil shall not be compacted.

Areas in which subsoil or topsoil have been placed shall not be disturbed by traffic or other operations and shall be protected and maintained by the Contractor in a satisfactory condition.

3.10 FINISHING

The surface of excavations, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified as in paragraph SUBGRADE. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

3.11 TESTING

Testing shall be performed by an approved commercial testing laboratory, or by the Contractor, subject to approval by the Contracting Officer. If the Contractor elects to establish testing facilities, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved by the Contracting Officer. The first inspection will be at the expense of the Government. Cost incurred for any subsequent inspections required because of failure of the first inspection will be charged to the Contractor. Field in-place density shall be determined in accordance with ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals, as directed by the Contracting Officer. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by, or under the direct supervision of, the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.11.1 Fill and Backfill Material Gradation

One test per 750 cubic yards of stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM D 422.

3.11.2 In-Place Densities

a. One test per 2000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 1000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

3.11.3 Moisture Content

In the stockpile, a minimum of two tests per day per type of material, or source of material, being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

3.11.4 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type of material, or source of material, to determine the optimum moisture and laboratory maximum density values. One representative test shall be conducted per 1000 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.11.5 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE shall be made during construction of the subgrades.

-- End of Section --

SECTION 02320

SILT FENCE

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 3786	(2001) Hydraulic Bursting Strength of Textile Fabrics - Diaphragm Bursting Strenght Tester Method
ASTM D 4355	(2002) Deterioration of Geotextiles from Exposure to Light,Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permitivity
ASTM D 4533	(1991; R 1996) Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	(1986; R 2001) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4632	(1991; R 1996) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2000e1) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 5261	(1992; R 1996) Measuring Mass per Unit Area of Geotextiles
ASTM D 5199	(2001) Measuring Nominal Thickness of Geosynthetics

ARMY CORPS OF ENGINEERS (COE)

COE-02215-86	(1986) Plastic Filter Fabric

1.1 SCOPE OF WORK

Work under this section shall consist of installing, maintaining, and removing Silt Fence for use as a soil erosion and sediment control measure during the life of the Contract as shown on the plans and as directed by

the Contracting Officer.

The Contractor shall carefully protect all preserved areas as shown on the plans, and shall also be liable for any and all damages to property caused by the work under this section. Any damages to property or to vegetation within preserved areas shall be restored to the original conditions to the satisfaction of the Contracting Officer.

1.3 SUBMITTALS

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

SD-03 Product Data

Silt Fence; G, RO.
Submit product information 30 days prior to starting work.

PART 2 PRODUCTS

2.1 MATERIALS

Field constructed Silt Fence assemblies shall consist of a woven geotextile, posts, and fasteners. Prefabricated fence systems may be used provided that all requirements of this specification are met and the system is approved by the Contracting Officer. Materials for Silt Fence shall conform to the following:

Geotextile: Geotextile shall be a woven, UV stabilized, polypropylene silt film, 3 feet in height, meeting the following requirements:

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength	ASTM D 4632	pounds	90
Grab Tensile Elongation	ASTM D 4632	percent	15
Trapezoid Tear Strength	ASTM D 4533	pounds	50
Mullen Burst Strength	ASTM D 3786	pounds/sq. inch	200
Puncture Strength	ASTM D 4833	pounds	50
Percent Open Area	COE-02215-86	percent	1
Apparent Opening Size	ASTM D 4751	U.S. Sieve	No. 30
Permitivity	ASTM D 4491	1/sec	0.1
Flow Rate	ASTM D 4491	gallons/minute/foot	10.0
UV Resistance (at 500 hours)	ASTM D 4355	percent strength retained	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	ounces/sq. yard	3.2
Thickness	ASTM D 5199	mils	15

Line Posts: Metal, wood or synthetic posts may be used. If wood stakes are used, they shall be 2 inch X 2 inch nominal, minimum 4

feet in height. If steel posts are used, they shall be u-shaped with a minimum weight of 1 pound 6 ounces per foot.

Fasteners: Fasteners shall be heavy duty, hot dipped galvanized staples, hog rings, tie wires or any other fastener compatible with the post material and approved by the Contracting Officer. If tie wire is used, it shall be 3/16 inch aluminum.

PART 3 EXECUTION

3.1 INSTALLATION

All soil erosion and sediment control measures, shall be installed prior to the commencement any construction activities at the site, except for the Silt Fence that will surround stockpiles, in accordance with the plans and specification.

Any vegetation within preserved areas damaged by the work under this section, as determined by the Contracting Officer, shall be replaced immediately after the completion of the work at no additional cost to the Government.

Unless otherwise directed by the Contracting Officer, the fence shall be installed as follows:

1) Line posts shall be driven into the ground to a minimum depth as shown on the plans, or adequately anchored if rock is encountered. Posts shall be spaced as shown on the plans.

2) Geotextile shall be placed on the upland side of the posts, so that the posts are closer to the waterbody.

3) The geotextile shall be attached to each post in no less than three locations with approved fasteners.

4) Any geotextile splices necessary for fence erection shall be continuous between two post sections.

6) The bottom of the geotextile shall be buried in a wide trench as shown on the plans. The trench shall be backfilled with the excavated soil and the soil compacted by tamping.

3.2 MAINTENANCE

The Contractor shall continuously maintain the integrity of the Silt Fence, including providing all necessary labor, equipment, and materials, until earthwork construction is completed and permanent erosion control measures are in place. The Contractor shall inspect all Silt Fence on a daily basis. The Contractor shall also inspect all fence immediately after each storm and at least daily during prolonged rainfall or tidal cycles to determine if the fence is functioning as designed. The Contractor shall immediately correct any deficiencies. Should the fence become damaged or otherwise ineffective while the barrier is still necessary, the Contractor shall immediately repair or replace defective or damaged portions of the fence assembly. Torn or punctured fabric shall be repaired by the placement of a patch, on the up slope side, consisting of an additional layer of fabric over the damaged area.

Maintenance of the Silt Fence should continue until permanent erosion and

sediment control measures are in place, established or stabilized to the satisfaction of the Contracting Officer. Sediment deposits shall be removed wherever the deposit or debris buildup creates breaches or bulges in the fence or more than 6 inches of material has accumulated. All sediment deposits shall be disposed of in the Phragmites Australis Disposal Area, in the Proposed Grassland area (only underneath the clean sand cap) or as directed by the Contracting Officer.

3.3 FENCE REMOVAL

Silt Fence shall remain in place as shown in the plans until the Contracting Officer directs its removal. Upon removal, the Contractor shall remove and dispose of any sediment accumulations and restore the area as directed by Contracting Officer. The fence materials shall become the property of the Contractor and be removed from the site. Any vegetation disturbed during fence removal shall be replanted at no additional cost to the Government.

3.4 RE-USE OF FENCE MATERIALS

Silt fence may be re-used on site for installation at a new location as directed by the Contracting Officer, only if the materials are determined by the Contracting Officer to be in good and useable condition. Geotextile fabric must be intact, without holes, tears or fraying. Stakes must be the specified height and not rotten, splintered or broken. Re-used materials used for installation of Silt Fence shall conform to the same specifications for new materials. The Contracting Officer may reject any or all salvaged materials and require the use of new materials on all silt fences in order to meet specifications.

-- End of Section --

SECTION 02378A

GEOTEXTILES USED AS FILTERS

Item Number 41: Separation Geotextile

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work under this section shall include furnishing, delivering, and installing all material, labor, equipment, tools, and incidentals necessary to complete the work specified herein.

1.2 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 288	Standard Specification for Geotextile Specification for Highway Applications-HM -22; Part IB

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4354	(1999) Sampling of Geosynthetics for Testing
ASTM D 4491	(1999a) Water Permeability of Geotextiles By Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	(1986; R 2001) Standard Test Method for Tensile Properties of Geotextiles by the Wide-WidthStrip Method
ASTM D 4632	(1991; R 1996) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2000el) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-2-1601	(1994) Hydraulic Design of Flood Control Channels

1.3 SUBMITTALS

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

SD-03 Product Data

Separation Geotextile; G, RO

Submit product information, including physical properties of the fabric, 30 days prior to starting work.

SD-04 Samples

Separation Geotextile; G, RO

Submit samples for testing to determine compliance with the requirements in this specification. Geotextile shall be randomly sampled in accordance with ASTM D 4354 (Procedure Method A). Submit samples a minimum of 15 days prior to the beginning of installation. All samples provided shall be from the same production lot as will be supplied for the contract, and shall be the full manufactured width of the geotextile by at least 10 feet long, except that samples for seam strength may be a full width sample folded over and the edges stitched for a length of at least 5 feet. Samples shall be identified by manufacturers lot designation.

SD-06 Test Reports

Testing; G, RO

Submit testing results prior to installing geotextile.

SD-07 Certificates

Separation Geotextile; G, RO

Submit certificate of compliance signed by a legally authorized official of the manufacturer. The certificate shall state that the materials shipped to the site meet the chemical, physical and manufacturing requirements stated in this specification. Upon request of the Contracting Officer, submit manufacturer's quality control and quality assurance tests.

1.4 SHIPMENT, HANDLING, AND STORAGE

Only approved geotextile rolls shall be delivered to the project site. All geotextile shall be labeled, shipped, stored, and handled in accordance with ASTM D 4873. No hooks, tongs, or other sharp instruments shall be

used for handling geotextile.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Separation Geotextile

Geotextile used in separation applications shall conform to the following AASHTO-M-288 properties for separation geotextiles:

	ASTM TEST	Non Woven	Woven
Structure		Non Woven	Woven
Elongation	D 4595	>=50%	>=50%
Grab Strength	D 4632	700N (157LBF)	1100N (247LBF)
Tear Strength	D 4533	250N (56LBF)	400N (90LBF)
Puncture Strength	D 4833	250N (56LBF)	400N (90LBF)
Permitivity	D 4491	0.02/second min.	
Apparent Opening Size	D 4751	0.6 millimeter max.	

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces on which the geotextile will be placed shall be prepared to a relatively smooth surface condition, and stumps, other organic material, large boulders, and sharp objects which may tear or damage the geotextile shall be removed. Any irregularities will be removed so as to insure continuous, intimate contact of geotextile with all the surface. Any loose material, soft or low density pockets of material or vegetation shall be removed. Erosion features such as rills, gullies, etc. must be graded out of the surface before geotextile placement.

3.2 INSTALLATION

3.2.1 General

Geotextile shall be placed in the manner and at the locations shown. At the time of installation, geotextile shall be rejected and replaced at no additional cost to the Government if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.

Geotextile shall be installed "in the dry." Installation of geotextile shall not proceed in areas which are inundated. Work shall proceed in only those areas during a time at which the areas are drained.

3.2.2 Placement

Geotextile shall be placed with the long dimension parallel to the shoreline and laid smooth and free of tension, stress, folds, wrinkles, or creases. The strips shall be placed to provide a minimum width of 18 inches of overlap for each joint. The placement procedure requires that the length of the geotextile be approximately 10 percent greater than the slope length. The Contractor shall adjust the actual length of the geotextile used based on initial installation experience. Temporary pinning to help hold the geotextile in place until fill material is placed shall be allowed. The temporary pins shall be removed as the fill material is placed to relieve high tensile stress which may occur during placement of

fill material on the geotextile. Design protection of any fill material should be in compliance with EM 1110-2-1601. Trimming shall be performed in such a manner that the geotextile shall not be damaged in any way.

3.3 PROTECTION

Geotextile shall be protected at all times during construction from contamination by surface runoff and any geotextile so contaminated shall be removed and replaced with uncontaminated geotextile. No equipment, materials or machinery shall be placed on or be transported over the geotextile. Any damage to the geotextile during its installation or during placement of fill material shall be replaced by the Contractor at no cost to the Government to the satisfaction of the Contracting Officer.

Work shall be scheduled so that covering of the geotextile is accomplished prior to tidal inundation of the area. Failure to comply shall require replacement of geotextile. Geotextile shall be protected from damage prior to and during the placement of fill material. This may be accomplished by limiting the height of drop to less than 1 foot, by placing a cushioning layer of sand or gravel on top of the geotextile before placing the fill material, or other methods deemed necessary. Care should be taken to ensure that the utilized cushioning materials shall not impede the flow of water. Before placement of fill material, the Contractor shall demonstrate that the placement technique will not cause damage to the geotextile. In no case shall any type of equipment be allowed on the unprotected geotextile.

3.4 OVERLAPPING

The overlap of geotextile rolls shall be 18 inches. Appropriate measures will be taken to insure required overlap exists after cushion placement.

3.5 TESTING

Samples shall be collected at approved locations upon delivery to the site at the request of the Contracting Officer in accordance with ASTM D 4354 (Procedure Method B). Samples shall be tested to verify that the geotextile meets the requirements specified under paragraph MATERIALS. Samples shall be identified by manufacturers name, type, lot number, roll number, and machine direction. Testing shall be performed at an approved laboratory. Test results from the lot under review shall be submitted and approved prior to deployment of the lot. Rolls which are sampled shall be immediately rewrapped in their protective covering.

-- End of Section --

SECTION 02380A

STONE PROTECTION
10/01

Item Number 24: Riprap
Item Number 42: Riprap for Wetland Protection

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 127	(2001) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 295	(2003) Petrographic Examination of Aggregates for Concrete
ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D 4992	(1994; R 2001) Evaluation of Rock to be Used for Erosion Control
ASTM D 5312	(1992; R 1997) Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
ASTM D 5313	(1992; R 1997) Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions
ASTM E 548	(1994el) General Criteria Used for Evaluating Laboratory Competence

U.S ARMY CORPS OF ENGINEERS (USACE)

EM 1110-2-1601	(1994) Hydraulic Design of Flood Control

1.2 SUBMITTALS

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

SD-03 Product Data

Riprap; G, RO

Riprap for Wetland Protection; G, RO

Submit product information 30 days prior to starting work.

SD-04 Samples

Riprap

Riprap for Wetland Protection

Submit suitable riprap samples prior to delivery of any such material to the worksite if riprap is not from one of the sources listed at the end of this section.

SD-06 Test Reports

Gradation Testing

Evaluation Testing

Quality test on the riprap in accordance with subparagraph Evaluation Testing shall be the responsibility of the Contractor. Prior to delivery of such material to the worksite, submit a copy of the laboratory inspection report along with actions taken to correct deficiencies. Submit a copy of the test reports. At least 60 calendar days in advance of shipment of riprap to the work site, submit a copy of bulk specific gravity test results. The information shall be furnished prior to preparation of pre-production demonstration stockpiles.

SD-07 Certificates

Riprap; G, RO.

Riprap for Wetland Protection; G, RO.

Submit certificates of compliance attesting that the materials meet specification requirements.

Laboratory

Submit a copy of the documents, provided by the Materials Testing Center (MTC) at CEWES, that validates that the laboratory can perform the required tests. The individual tests shall be listed for which the validation covers along with the date of the inspection.

1.3 RIPRAP SOURCES

Riprap shall be furnished from any source designated by the Contractor and accepted by the Contracting Officer, subject to the conditions herein stated.

a. Selection of Source. The Contractor shall designate in writing only one source or one combination of sources from which he

proposes to furnish riprap. It is the Contractor's responsibility to determine that the riprap source or combination of sources selected is capable of providing the quality, quantities and gradation needed and at the rate needed to maintain the scheduled progress of the work.

b. Acceptance of Materials. Acceptance of a source of riprap is not to be construed as acceptance of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable for riprap as determined by the Contracting Officer. The Contracting Officer also reserves the right to reject individual units of produced specified materials in stockpiles at the quarry, all transfer points, and at the project construction site when such materials are determined to be unsuitable. During the course of the work, the riprap may be tested by the Government, if the Contracting Officer determines that testing is necessary. If such tests are determined necessary, the testing will be done in commercial laboratory. During the contract period, both prior to and after materials are delivered to the job site, visual inspections and measurements of the riprap materials may be performed by the Contracting Officer. If the Contracting Officer, during the inspections, finds that the riprap quality, gradation or weights being furnished are not as specified or are questionable, re-sampling and re-testing by the Contractor shall be required. Sampling of the delivered riprap for testing and the manner in which the testing is to be performed shall be as directed by the Contracting Officer. This additional sampling and testing shall be performed at the Contractor's expense when test results indicate that the materials do not meet specified requirements. When test results indicate that materials meet specified requirements, an equitable adjustment in the contract price will be made for the sampling and testing. Any material rejected shall be removed or disposed of as specified and at the Contractor's expense.

1.4 CONSTRUCTION TOLERANCES

The finished surface and riprap thickness shall not deviate from the lines and grades shown by more than the tolerances listed below. Neatline tolerances are measured perpendicular to the indicated neatlines. Extreme limits of the neatline tolerances given shall not be continuous in any direction for more than 5 times the nominal stone dimension nor for an area greater than 100 square feet of the structure surface.

NEATLINE TOLERANCES

MATERIAL	ABOVE NEATLINE	BELOW NEATLINE
Riprap	2 inches	2 inches
Riprap for Wetland Protection	3 inches	3 inches

The intention is that the work shall be built generally to the required elevations, slope, and grade and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Contracting Officer. Payment will not be made for excess material which the Contracting Officer permits to remain in place.

1.5 DEFINITIONS

1.5.1 Riprap

Riprap is defined as a material having a gradation band similar to those specified in EM 1110-2-1601, Chapter 3, uniform graded material. Riprap is normally produced by mechanical methods, with a jaw crusher and grizzly after the stone has been mined by blasting in a quarry. Riprap gradations have a minimum top size of 3.5 tons.

1.5.2 Riprap for Wetland Protection

Riprap for wetland Protection is small-sized riprap placed atop geotextile along the waterward edge of the created wetland to contain fill and minimize scouring, and otherwise stabilize the bank. Riprap gradation shall be a maximum of 12 inches.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Riprap

Only quarried stone shall be used. Riprap quality shall be as specified in paragraph STONE SOURCES. Stone shall be well graded and shall conform to the table below.

TABLE 1
(FOR RIPRAP)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	86 - 35
50	26 - 17
15	13 - 5

2.1.2 Riprap for Wetland Protection

Riprap for Wetland Protection quality shall be consistent with the paragraph RIPRAP SOURCES. Riprap for Wetland Protection shall consist of crushed stone, sized as indicated on the plans, with a maximum fragment size of 12 inches. No individual fragment shall exceed a weight of 150 pounds and no more than 10 percent of the mixture, by weight, shall consist of fragments weighing 5 pounds or less each. Specific gravity of the rock shall be a minimum of 2.50. Rock shall be free from cracks, seams, and other defects that would increase the risk of deterioration from natural causes. The inclusion of more than trace 1 percent quantities of dirt, sand, clay, and rock fines will not be permitted. Material shall be composed of tough, durable particles. Fines passing the 75 micrometers No. 200 standard sieve shall have a plasticity index less than 6.

2.2 Riprap Stockpile

Storage of riprap at the worksite is not to be confused with off-site stockpiling of riprap. If the Contractor elects to provide off-site stockpiling areas, the Contracting Officer shall be notified by the Contractor of all such areas. The first layer shall be a maximum of 6 feet high. After being stockpiled, any riprap which has become contaminated with soil or refuse shall not be put into the work unless the contaminating

material has been removed from the riprap prior to placement.

PART 3 EXECUTION

3.1 BASE PREPARATION

The Contractor shall follow the surface preparation requirements for areas on which riprap is underlain by geotextile as described in Section 02378A GEOTEXTILES USED AS FILTERS.

Areas on which riprap is to be placed shall be graded and/or dressed to conform to the subgrade elevations shown on the plans within an allowable tolerance of plus 2 inches and minus 4 inches. The prepared base shall be approved by the Contracting Officer prior to installation of geotextile or riprap.

3.2 INSTALLATION OF GEOTEXTILE

Installation of geotextile shall be as specified in Section 02378A GEOTEXTILES USED AS FILTERS.

3.3 INSTALLATION OF RIPRAP

3.3.1 Excavation

Excavation in areas where riprap is to be placed shall be performed so that riprap can be installed at the depth and slopes indicated on the plans. Excavation shall be performed in accordance with Section 02300A EARTHWORK. Excavated materials shall be disposed of as described in Section 02226 EXCAVATION OF CONTAMINATED RIVER SEDIMENT MATERIAL FROM BELOW MEAN HIGH TIDE and Section 02227 EXCAVATION OF NON-HAZARDOUS MATERIAL ABOVE MEAN HIGH TIDE.

3.3.2 Placement

Riprap for Wetland Protection shall be installed as shown on the plans. Riprap shall be installed "in the dry." Installation shall not proceed in areas which are inundated. Work shall proceed in only those areas during a time at which the areas are drained. Riprap shall be underlain with Separation Geotextile and placed so as not to damage the geotextile as described in Section 02378A GEOTEXTILES USED AS FILTERS.

Riprap shall be placed in a manner which will produce a well-graded mass of rock with the minimum practicable percentage of voids, and shall be constructed, within the specified tolerances, to the lines and grades shown on the plans. A tolerance of plus 3 inches and minus 3 inches from the slope lines and grades shown on the plans will be allowed in the finished surface of the riprap, except that the extreme of this tolerance shall not be continuous over an area greater than 200 square feet. The average tolerance of the entire job shall have no more than 50 percent of the tolerances specified above. Riprap shall be placed by means of crane operated skip-pan (box), clamshell, rock-bucket, hydraulic excavator, trackhoe, or other approved equipment. The use of tractor loaders or other equipment commonly referred to as front end loaders shall not be permitted. The large stones shall be well distributed and the entire mass of stones in their final position shall be graded to conform to the gradation specified in subparagraph Riprap for Wetland Protection. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed

material in such a manner as to ensure a relatively homogenous mass. 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 it into chutes, or by similar methods likely to cause segregation of the various sizes, shall not be permitted. Placing riprap by dumping it at the top of the slope and pushing it down the slope shall not be permitted. No equipment shall be operated directly on the completed stone protection system. 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. Each truckload shall be representative of the gradation requirements. Rearranging of individual stones, by hand if necessary, may be required to obtain a well-graded distribution of stone sizes as specified above.

3.4 INSPECTIONS AND TESTING

3.4.1 Pre-Production

3.4.1.1 Approval of Demonstration Stockpile at Source

At such time the Contracting Officer finds the contents of a demonstration stockpile to be acceptable, either through visual examination or through laboratory testing, the Contractor will be notified in writing that the source, the QCP plan, and QCP staff are approved, whereupon the Contractor may proceed with production of materials for the Project provided they are consistent with demonstration stockpiles.

3.4.1.2 Duration of Demonstration Stockpile at Source

Other than for being shipped as the final quantities of materials to be placed in the work, each demonstration stockpile shall remain unchanged at the source until all other required material of the size range represented by the stockpile has been shipped from the source.

3.4.2 Placement Control

The Contractor shall establish and maintain quality control for all work performed at the job site under this section to assure compliance with contract requirements. The Contractor shall maintain records of quality control tests, inspections and corrective actions. Quality control measures shall cover all construction operations included under this section.

3.4.2.1 Check Surveys

Surveys made by the Contractor are required on each material placed for determining that the materials are acceptably placed in the work. The Contractor shall make checks as the work progresses to verify lines, grades and thicknesses established for completed work. At least 1 check survey as specified below shall be made by the Contractor for each 25-foot section as shown as practicable after completion. Approval of check surveys shall not constitute final acceptance of the work. The surveys shall be conducted in the presence of an authorized representative of the Contracting Officer, unless this requirement is waived by the Contracting Officer.

3.4.3 Evaluation Testing

The Contractor shall have evaluation tests performed on stone samples collected from the proposed source. The quarry investigation shall be performed by a registered geologist or registered engineer. The tests to which the stone shall be subjected include bulk specific gravity (SSD), unit weight, absorption (ASTM C 127), resistance of stone to freezing and thawing (ASTM D 5312), and if argillaceous limestone and sandstone are used, resistance to wetting and drying (ASTM D 5313).

The tests shall be conducted by the Contractor in accordance with applicable ASTM and Corps of Engineers methods of tests given in the Handbook for Concrete and Cement, and shall be performed at a laboratory validated by the government. The cost of testing shall be borne by the Contractor.

The laboratory to perform the required testing shall be validated based on compliance with ASTM E 548 and relevant paragraphs of ASTM D 3740, and no work requiring testing shall be permitted until the laboratory has been inspected and validated. The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection shall be at the expense of the Contractor.

a. Bulk Specific Gravity Range. All stone shall have a minimum bulk specific gravity, saturated surface dry (SSD), of 2.50 and a maximum bulk specific gravity of not more than 2.90 based upon water having a unit weight of 62.4 pounds per cubic foot. The method of test for bulk specific gravity (SSD) shall be ASTM C 127.

b. Unit Weight and Absorption. Stone shall weigh more than 65 pounds per cubic foot and have a bulk specific gravity, saturated surface dry, greater than 2.60. The stone shall have an absorption less than 2 percent unless other tests and service records show that the stone is satisfactory. The method of test for unit weight and absorption shall be ASTM C 127, except the unit weight shall be calculated in accordance with Note No. 5 using bulk specific gravity, saturated surface dry.

c. Resistance to Freezing and Thawing. Stone shall have a maximum loss of 10 percent after the number of cycles specified in ASTM D 5312, Figure 1, when determining the durability of stone when subjected to freezing and thawing in accordance with ASTM D 5312, except the surface area of one side of the sample shall be between 144 square inches and 2304 square inches.

d. Resistance of Rock to Wetting and Drying. Stone shall have a maximum loss of 2 percent when determining the durability of stone when subject to wetting and drying in accordance with ASTM D 5313, except the surface area of one side of the sample shall be between 144 square inches and 2304 square inches.

3.4.4 Gradation Testing

The Contractor shall perform a gradation test or tests on the riprap at the quarry in accordance with subparagraph Gradation Tests. The sample shall be taken by the Contractor in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer not less than 3 days in advance of each test. In the event of unavailability of the Contracting

Office, the Contractor shall perform the tests and certify to the Contracting Officer that the riprap shipped complies with the specifications. At least one gradation test shall be performed per 50,000 tons of each size of riprap placed, but not less than one test shall be performed. The gradation tests shall be reported using the forms, GRADATION TEST DATA SHEET, attached at end of this section. The Contractor shall designate on the test form that portion intons of the lot tested which is applicable to this contract. Any deviation from the reported tonnage shall be corrected and recorded on a revised GRADATION TEST DATA SHEET. The sample shall consist of not less than 25 tons of riprap, and shall be collected in a random manner which will provide a sample which accurately reflects the actual gradation arriving at the jobsite. Failure of the test on the initial sample and on an additional sample will be considered cause for rejection of the quarry and/or quarry process, and all riprap represented by the failed tests shall be set aside and not incorporated into the work. Any additional tests required because of the failure of an initial test sample will not be considered as one of the other required tests. If collected by the truckload, each truckload shall be representative of the gradation requirements. The Contracting Officer may direct additional testing of the riprap at the project site if the riprap appears, by visual inspection, to be out of gradation. If the gradation test fails, additional gradation tests will be required at the Contractor's expense to delineate the limits of unacceptable stone. The additional gradation tests shall not count as part of the minimum number of gradation tests required. The unacceptable stone shall either be reworked to bring the stone within the specified gradation or the stone shall be removed from the project site as determined by the Contracting Officer. The Contracting Officer may direct this testing under the Contract Clause INSPECTION OF CONSTRUCTION. The Contractor shall provide all necessary screens, scales and other equipment, and operating personnel, and shall grade the sample. Certification and test results shall represent riprap shipped from the quarry. Certification and tests results must be received by the Contracting Officer at the jobsite before the riprap is used in the work.

3.4.4.1 Methodology

The following methods shall be used to test the gradation of stone:

a. Select a representative sample (see Note No. 1 below), weigh and dump on hard stand.

b. Select specific sizes (see example gradation table below) on which to run "individual weight larger than" test (see Note No. 2 below). Procedure is similar to the standard aggregate gradation test for "individual weight retained".

c. Determine the largest size stone in the sample (100 percent size).

d. Separate by "size larger than" the selected weights, starting with the larger sizes. Use reference stones, with identified weights, for visual comparison in separating the obviously "larger than" stones. Stones that appear close to the specific weight must be individually weighed to determine size grouping. Weigh each size group, either individually or cumulatively.

e. Part d above will result in "individual weight retained" figures. Calculate individual percent retained (heavier than), cumulative percent retained, and cumulative percent passing (lighter than).

Plot percent passing, along with the specification curve on ENG Form 4794-R.

NOTE NO. 1: Sample Selection: The most important part of the test and the least precise is the selection of a representative sample. No "standard" can be devised; larger quarry run stone is best sampled at the shot or stockpile by given direction to the loader; small graded stone is best sampled by random selection from the transporting vehicles. If possible, all parties should take part in the sample selection and agree before the sample is run that the sample is representative.

NOTE NO. 2: Selection of Size for Separation: It is quite possible and accurate to run a gradation using any convenient sizes for the separation, without reference to the specifications. After the test is plotted on a curve, then the gradation limits may be plotted. Overlapping gradations with this method are no problem. However, it is usually more convenient to select points from the gradation limits, such as the minimum 50 percent size, the minimum 15 percent size, and one or two others, as separation points. For these types of stone gradations the separation points need to be selected as the smallest size stone at each break in the gradation specified.

F O R
E X A M P L E
O N L Y

EXAMPLE GRADATION
SPECIFICATIONS

PERCENT LIGHTER BY WEIGHT	STONE WEIGHT IN LBS.
100	400 - 160
50	160 - 80
15	80 - 30

EXAMPLE WORKSHEET

STONE SIZE LBS.	INDIVIDUAL WT. RETAINED	INDIVIDUAL PERCENT RETAINED	CUMULATIVE PERCENT RETAINED	PASSING
400	0	0	0	100
160	9,600	30	30	70
80	11,200	35	65	35
30	8,000	25	90	10
<30	3,200	10	100	-
TOTAL	32,000 pounds			

NOTE: Largest stone 251 pounds

G R A D A T I O N T E S T D A T A S H E E T

Quarry _____ Type of Stone Tested _____

Date of Test _____ Testing Rate _____

T E S T R E P R E S E N T S

Contract No.	District	Tons
	TOTAL	

G R A D A T I O N

Stone Size (lbs)	Weight Retained	Individual % Retained	Cumulative % Ret.	Cumulative % Pass	Specification % Finer by wt
Total Weight					
Max Size Stone =					

Remarks:

_____

I certify that the above stone sample is representative of the total tonnage covered by this test report.

Contractor Representative _____
Government Representative _____

-- End of Section --

SECTION 02381

ANTI-TRACKING PAD

PART 1 GENERAL

1.1 SCOPE OF WORK

Under this section, the Contractor shall install a temporary Anti-tracking Pad for use as a soil erosion and sediment control measure during the life of the Contract in accordance with the plans and specifications, and as directed by the Contracting Officer. The pad shall be located at the temporary work entrance off of Avenue U, as as shown on the plans.

During construction, use, and maintenance of Anti-tracking Pad, care shall be taken to avoid damage to vegetation surrounding the pad. Any damages to vegetation surrounding the pad shall be replaced or restored to the original conditions to the satisfaction of the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

Aggregate For Anti-tracking Pad shall conform to the materials requirements described in Section 02731 AGGREGATE SURFACE COURSE.

Filter Fabric-Stabilization shall conform to the materials requirements described in Section 02378A GEOTEXTILES USED AS FILTERS.

PART 3 EXECUTION

3.1 METHODS

The Anti-tracking Pad shall be constructed and maintained to adequately support loads and withstand exposure to traffic during the entire construction period. The Anti-tracking Pad shall be located and installed in accordance with the plans and specifications.

The Contractor shall excavate and/or fill the footprint areas of the Anti-tracking Pad as shown on the plans. Filter Fabric-Stabilization shall be installed along the footprint of these areas as shown the plans and in accordance with the requirements under Section 02378A GEOTEXTILES USED AS FILTERS. Temporary Stone For Anti-tracking Pad shall then be placed on top of the filter fabric and graded to create a flat surface.

The Contractor shall adequately maintain the Anti-tracking Pad, including but not limited to cleaning out accumulated sediment from the pad and replacing or resetting stone as deemed necessary by the Contracting Officer. The Contractor shall be responsible for maintaining legal roads free of soil debris and sediment as a result of the transferring and hauling operation.

All materials used to create the Anti-tracking Pad shall be removed and disposed of off-site in accordance with the plans and to the satisfaction of the Contracting Officer. If necessary, fill shall be placed and graded within the footprint area of the Anti-tracking Pad to blend in with the surrounding grades.

During construction, use, and maintenance of Anti-tracking Pad, care shall be taken by the Contractor to avoid damage to vegetation surrounding the pad. Any vegetation damaged by the installation, use or maintenance of the pad, as determined by the Contracting Officer, shall be replaced immediately after the completion of the work.

-- End of Section --

SECTION 02390

ANCHORS

Item Number 5: Anchors

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein. The Contracting Officer shall have the right to increase or decrease the number of anchors to be installed and to change the locations and elevations at which the anchors are to be installed.

1.2 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 36/A 36M	(2003) Standard Specification for Carbon Structural Steel
ASTM A 307	(2003) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 416/A 416M	(2002) Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
ASTM A 722/A 722M	(1998; R 2003) Standard Specification for Uncoated High Strength Steel Bars for Prestressed Concrete
ASTM C 150	(2003) Standard Specification for Portland Concrete

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

A minimum of 30 days prior to commencement of anchor-related work, submit the following:

Equipment; G, RO

Detailed descriptions (including makes and models) of all drilling, anchor-installation equipment, including grouting, post-tensioning, and testing equipment and accessories to be employed in the work.

Materials; G, RO

Type of cement, water-cement ratio, additive types and their concentrations, time, date and anchor number for all grout cubes prepared, volume of grout placed.

Work Plan; G, RO

Proposed construction sequence, including sequence of operations pertaining to bracing and blocking of steel sheet piling prior to and during stressing of anchors.

Procedures

Procedures for drilling for and placement of anchors.

Setups

Equipment setups for monitoring tendon elongation and movement of walls during tests of anchors.

SD-07 Certificates

Materials

Tendon manufacturer's mill test reports for the anchors.

Applicable manufacturer certification and/or literature for anchorage fittings and accessories.

Applicable literature from cement grout suppliers giving details on setting times as a function of temperature, strength gain with time, and recommended storage, mixing and placement procedures.

Equipment

Certificate indicating the anchor testing equipment was calibrated (by an independent testing laboratory) no more than 20 working days prior to the initial testing of anchors on the project site. The calibration shall be in the form of gauge pressure versus actual jack force.

SD-13 Records

Documentation

As-built drawings showing the locations of installed anchors, total anchor lengths, stressing lengths, bond lengths, and loads. Submit report no later than 20 working days after completion of anchor-related work.

Documentation pertaining to the following work: drilling of the anchor hole, water testing, grouting, testing and stressing of anchors, equipment used, calibration data, type of steel tendons, location and types of splices (if any), material and procedures used for corrosion protection.

1.4 EXPERIENCE

The work shall be performed by a general contractor or specialty subcontractor specializing in the specified anchor system , and having the experience of completing a minimum of five projects where the specified anchor system was installed under similar subsurface conditions. Subsurface data logs are included in the project specifications.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Tendons

Tendons shall be low-relaxation, high-strength, steel strands meeting the requirements of ASTM A 416/A 416M uncoated, seven-wire low-relaxation strand for prestressed concrete, or bars meeting the requirements of ASTM A 722/A 722M "Specification for Uncoated, High-Strength Steel Bars for Prestressed Concrete". The sheath encapsulating the tendons shall be able to safely withstand deformations occurring during transportation, installation, stressing, testing, and load transfer to the tendons. The bonded and unbonded lengths shall be at least the minimum shown on the Contract Drawings. The unbonded length shall be protected with smooth sheaths that are filled with corrosion inhibitor, corrugated sheath filled with grout, and secondary grout after stressing. A corrugated plastic sheath shall encapsulate the entire bonded length of the tendon. The sheath shall have a minimum wall thickness of 0.06 inch. A Portland cement grout shall completely cover the tendon within the corrugated sheath.

2.1.2 Non-Shrink Grout

Cement shall be Type I or Type II conforming to the requirements of ASTM C 150. The type of cement shall be approved by the Contracting Officer. The type of cement used and proposed for approval shall be based on resistivity, PH, and sulfate tests performed on the subsurface materials by the Contractor. Cement which has been in storage for more than 30 days shall not be used. Cement shall be kept under cover and in a dry location. The lowest possible water-cement ratio with acceptable workability shall be used. In addition, the non-shrink grout shall conform to the following:

A. Prior to testing of anchors, verify by grout cube testing that the grout has sufficient strength to safely transfer the anchor load to the ground.

B. An approved additive shall be mixed with the grout as an expanding agent.

2.1.3 Centralizers and Spacers

Centralizers shall be provided at intervals no greater than 10 feet in the bond length and unbonded length, starting at the end so that no less than 0.5 inch of grout cover is achieved between the borehole and corrugated sheath over its full length. Strand spacers shall be used with multiple

element tendons within the corrugated sheath over the bonded and unbonded lengths, at intervals no greater than 10 feet. Centralizers and spacers may be made of any material, except wood, that is not deleterious to the prestressing steel or plastic sheath. Centralizers shall permit the free flow of grout. Steel plates and trumpets shall conform to ASTM A 36. All bolts, nuts and washers shall conform to ASTM A 307, or the tendon manufacturer's specifications.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Grout Mixing Equipment

Equipment for mixing grout shall be a high speed colloidal mixer with shearing action.

3.1.2 Preparation

Tendons shall be fabricated in accordance with reviewed details and shall be free of dirt, loose rust, or other deleterious substances. Prior to installation, tendons shall be handled and stored in such a manner as to avoid corrosion and physical damage. Damage, such as abrasions, cuts, nicks, welds, weld spatters, or heavy corrosion and pitting, shall be a cause for rejection of the element. Rejected elements shall be replaced at no cost to the Government in terms of either material replacement or resulting time delays. The bonded length shall be degreased prior to installation. Solvent residue shall remain on the tendon.

3.1.3 General

The hole for the anchor shall be drilled at locations indicated on the contract drawings. The drilled hole diameter shall be as determined by the contractor's analysis and design to produce the required load capacities. All final details shall be consistent with the specific anchorage system selected by the Contractor. Details shown on the plans shall be revised and/or supplemented, as required. The anchor hole shall extend at least 1 foot beyond the tendon length to be installed. The Contractor shall be responsible for maintaining an obstruction-free and open hole for grouting the anchor. The Contractor shall be solely responsible for determining the drilling method, grouting pressures, and anchor bonded length, subject to review by the Contracting Officer. The Contractor shall design the bonded length to satisfy the anchor testing acceptance criteria in accordance with the design loads. The grouting pressure and grouting method shall be based on consideration of existing ground conditions. The drilling method used shall cause minimum disturbance to the surrounding ground and not result in any ground loss nor in collapse of the hole during drilling, and maintain the position and inclination of the drilled hole, allow the hole to reach the design depth, and produce the design diameter of the drilled hole. Temporary casing may be used during drilling or placement of anchor. The temporary casing shall be withdrawn as grout is placed. The contractor shall immediately revise his operations to prevent reoccurrence of obstructed or otherwise unsatisfactory holes and modify anchor installation procedures as required. Any damage or adverse impacts to existing property or site conditions by such operations shall be cause for immediate halting of operations and repair to the satisfaction of the Contracting Officer. The contractor shall immediately revise his operations to prevent reoccurrence of such damage. Grout shall be injected at the lowest point of the anchor hole. Grouting shall proceed such that the hole is filled

without formation of air voids, grouting progressively from the bottom to top. The grout in the unbonded length zone shall be the same as that for the bonded length zone. The unbonded length grouting shall be done by gravity flow or low pressure pumping. Grout shall terminate 1 foot down-hole from the design end position of the protective trumpet using blockouts or other provisions, as needed, prior to stressing and testing. Final grouting up to the top of the hole shall be completed during positioning of the permanent anchorage system. The contractor shall provide the fittings or components needed to accomplish this. The grouting equipment shall be capable of continuous mixing and shall produce a grout free of lumps. The grout pump shall be equipped with a grout pressure gauge at the nozzle capable of measuring at least 150 psi or twice the actual pressure used. If grout loss from the drilled hole exceeds 3 times the volume of the annular space between the drilled hole and anchor, then anchor installation shall be discontinued and the anchor removed from the hole and cleaned. The contractor shall fully pressure grout the drilled hole with a cement grout at a pressure of at least 5 psi above hydrostatic pressure, redrill the hole 24 hours after the grout sets, and install anchor as described herein above. The contractor may, at his option, conduct a water pressure test in the drilled hole prior to grouting. When water loss is greater than 0.25 gallon per minute at a pressure of at least 5 psi above hydrostatic pressure (within the bonded length of the drill hole) measured for at least 10 minutes, then the drilled hole may be pressure grouted as described above.

3.1.4 Sequence of Operations

The Contractor shall adopt a sequence of operations and procedures, including a system for bracing and blocking, which will preclude deflection of the steel sheet piling during construction.

3.1.5 Alignment and Tolerances

Install anchors to within 1 degree of required inclination as shown on the contract drawings. Install anchors to within 1/2 inch of the required location unless otherwise approved or directed by the Contracting Officer.

3.2 ANCHOR TESTING

Each anchor shall be tested. Copies of all test results and graphs shall be transmitted to the Contracting Officer as each test is completed. Ground anchors shall be tensioned by direct pull with a hollow ram hydraulic jack of a model recommended by the anchor manufacturer, mounted to prevent bending of the anchor. Tensioning shall not commence until the cement grout has attained the design strength. Jacks shall have ram travel at least equal to the theoretical elastic elongation of the unbonded length plus the bonded length at the maximum test load. A pressure gauge shall be used with each jack. Gauges shall be calibrated with a single jack and shall not be used with any other jack. All gauges shall be accurate to read 100 psi changes in pressure. For performance tests, the jack used shall have 2 calibrated gauges: a master gauge and a back-up gauge. The jack shall be capable of applying each load increment in less than 60 seconds. A load cell, which has been calibrated by a certified independent testing laboratory no more than 14 days prior to the start of testing, shall be used to measure the changes in load during the load-hold portion of the performance tests. There shall be no substitute for the load cell during conduct of the performance tests.

3.2.1 Performance Tests

For the performance tests, the master gauges and back-up gauge shall be connected to the same pressure hose between the pump and jack and be used to measure the applied loads. If the load measured by the master gauge and back-up gauge differ by more than 10 percent, the jack, master gauge and back-up gauge shall be recalibrated as a unit at no cost to the Government. The weight of the jack and load cell shall be supported externally and not by the tendon. Use dial gauges with 0.001 inch precision, aligned perpendicular to the loading head, parallel to the tendon, to measure elongation of the tendon. The dial gauges shall be supported on independent reference points and shall be in direct contact with the tendon head or a rigid extension of the tendon head. All testing shall be performed in the presence of the Contracting Officer. Maintain each load increment or decrement for at least 1 minute, or until movement ceases. The first two or three anchors, as determined by the Contracting Officer, shall be performance tested; thereafter, a minimum of 5% of the remaining anchors shall be performance tested. The anchors to be performance tested shall be designated by the Contracting Officer. The performance tests shall include stressing and monitoring an anchor tendon. During testing, movement measured at the anchor head shall be monitored for each load increment to the nearest 0.001 inch from independent, fixed reference points. The loading sequence shall be as follows:

LOADING SEQUENCE

Cycle	Load
1	AL
	0.25 P
	AL
2	0.25 P
	0.50 P
	AL
3	0.25 P
	0.50 P
	0.75 P
	AL
4	0.25 P
	0.50 P
	0.75 P
	1.00 P
5	.25 P
	.50 P
	.75 P
	1.00 P
	1.20 P
	AL
6	0.25 P
	.50 P
	.75 P
	1.00 P
	1.20 P
	1.33 P (= Test Load)
	AL
	Adjust to lock-off load

LOADING SEQUENCE

During the load-hold periods, the anchor load shall not be allowed to deviate from the test pressure by more than 50 psi. Repumping to test load will compensate for small movements, hydraulic oil seepage and changes in temperature of the hydraulic oil. The load shall be returned to the specified test load prior to taking the movement reading at the specified interval. The test load shall not be exceeded during the period of observation.

P = Design capacity (as shown on contract drawings)
AL - Alignment Load (0.05 P)
LL = Lock-off Load = P

The maximum test load shall be held for 10 minutes. Total movements with respect to a fixed reference point shall be recorded at 1 minute, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between 1 minute and 10 minutes exceeds 0.04 inch, the test load shall be held for an additional 50 minutes. Total movements shall be recorded at 20, 30, 40, 50 and 60 minutes. The contractor shall plot the anchor movement versus load for each load increment. He shall also plot the creep movement for the load-hold stage as a function of the logarithm of time. The Contracting Officer will review this data from each performance test to determine whether the anchor is acceptable. Where, in the opinion of the Contracting Officer, significant differences are indicated from previous performance tests, additional performance tests shall be conducted on the next adjacent anchor to be installed.

3.2.2 Proof Test

Load cells are not required for proof tests. Proof test loads shall be monitored by calibrated master and back-up hydraulic pressure gauges. All anchors not performance tested shall be proof tested. The requirements for load and deflection monitoring during proof tests are the same as for performance tests, except that the loading sequence shall be as shown in the following:

AL
0.25 P
0.50 P
0.75 P
1.00 P
1.20 P
1.33 P (= Test Load)
AL

Adjust to Lock-off load LL after testing

Where:
P = Design load (as shown on contract drawings)
AL = Alignment Load (0.05 P)
LL = Lock-off Load = P

The Proof Test shall be conducted by incrementally loading the anchors in accordance with the loading sequence provided above. Each load increment shall be maintained for a maximum of one minute before advancing to the next load increment. Movement shall be recorded at each load increment. At the test load the load shall be maintained constant for 10 minutes and total movement readings shall then be recorded at 1, 2, 3, 4, 5, 6, and 10

minutes. If the total creep movement between 1 and 10 minutes exceeds 1mm (0.040 in), the Test Load then shall be maintained for an additional 50 minutes and the movement readings shall be recorded at 20, 30, 40, 50, and 60 minutes. During the load-hold periods, the hydraulic pressure shall not deviate from the Test Pressure by more than 50 psi and the load shall always be returned to the the Test Load prior to taking the movement reading.

3.3 CONSTRUCTION CONTROL

The anchor and components shall be stored in a protected location. There shall be no damage to steel. The inner sheaths surrounding the strands within the unbonded length shall be completely filled with an approved type of corrosion inhibitor and the unbonded length and bonded length shall conform to specified dimensions. The anchor shall be properly inspected before placement into the borehole. While inserting the anchor into the hole it shall be protected from any damage, especially damage to the corrosion protection media. Anchors shall be freely insertable to the prescribed length in the hole. Under no circumstances shall they be driven or pressed into the hole, or cut-off for insertion. In no case shall the unbonded length of an anchor be shortened to less than the minimum length shown on the contract drawings. The tendon shall be maintained concentric within the hole and within the corrugated sheathing by strand spacers throughout the unbonded length and bond length. Grout pressure shall be measured at the point of injection. The grout gate mechanism shall be cleaned prior to delivery to the site and periodically during the project to prevent clogging. Grout components shall be mechanically mixed for 5 to 10 minutes to ensure proper dispersion of cement. The established water-cement ratio shall be accurately controlled. The mix water shall be potable. Pumping and injection of the grout shall commence immediately after mixing. Grouting shall continue until the returning grout escaping from the hole is of the same composition as grout being injected. The trumpet shall extend beyond the top sheath. It shall remain undamaged during placement and stressing. The tendon shall not contact the trumpet at the bearing plate.

-- End of Section --

SECTION 02456A

STEEL H-PILES

Item Number 7: Steel H-Piles

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as appropriate) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein. The Contracting Officer shall have the right to increase or decrease the length of piles to be furnished and installed by changing the foundation pile locations or elevations, requiring the installation of additional piles, or requiring omission of piles from the requirements shown and specified.

1.2 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 690	(2000a) High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments
ASTM D 1143	(1981; R 1994) Piles Under Static Axial Compressive Load

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2002) Structural Welding Code - Steel

1.3 SUBMITTALS

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

SD-03 Product Data

Equipment; G, RO

Descriptions of all pile driving equipment to be employed in the work, prior to commencement of pile installations, including details of the pile hammer, power plant, leads, cushion material, and helmet.

SD-07 Certificates

Materials

Certified copies of mill test reports for structural steel prior to commencement of pile installations.

SD-13 Records

Pile Driving; G, RO

A complete and accurate record of each driven pile, within 3 days of completion of driving. The record shall indicate the pile location (as driven), size, driven length, embedded length, final elevations of tip and top, pile weight, number of splices and locations, blows required for each foot of penetration throughout the entire length of the pile and for the final 6 inches of penetration, and the total driving time. The record shall also include the type and size of the hammer used, the rate of operation, and the type and dimensions of driving helmet and cushion block used. Any unusual conditions encountered during pile installation shall be recorded and immediately reported to the Contracting Officer.

1.4 EXPERIENCE

The work shall be performed by a general contractor or a specialty subcontractor specializing in the specified foundation system and having experience installing the specified foundation system under similar subsurface conditions.

1.5 SUBSURFACE DATA

Subsurface soil data logs are shown in the specifications.

PART 2 PRODUCTS

2.1 MATERIALS

Piles shall be of sections, sizes, materials, and weights indicated. Pile tips as driven shall be square and blunt as received from the mill. Pile tip reinforcements or cast steel points occasionally may be required to obtain the required penetration. Steel shall conform to ASTM A 690. Test piles shall be identical to those used elsewhere in the project.

2.2 EQUIPMENT

2.2.1 Pile Hammers

The hammer used shall have a delivered energy suitable for the total weight of the pile, the character of subsurface material to be encountered, and the pile capacity to be developed. The driving energy of the hammer shall be not less than 15,000 foot-pounds per blow.

2.2.2 Driving Helmets and Pile Cushions

A driving helmet or cap, including a pile cushion, shall be used between the top of the pile and the ram to prevent impact damage to the pile. The driving helmet or cap and pile cushion combination shall be capable of protecting the head of the pile, minimizing energy absorption and dissipation, and transmitting hammer energy uniformly over the top of the pile. The driving helmet or cap shall fit loosely around the top of the

pile so that the pile is not restrained by the driving cap if the pile tends to rotate during driving. The pile cushion may be made of solid wood or of laminated construction using plywood, softwood, or hardwood boards or other cushion material as approved by the Contracting Officer. The pile cushion shall completely cover the top surface of the pile and shall be retained by the driving helmet. The minimum thickness of the pile cushion shall be 3 inches and the thickness shall be increased so as to be suitable for the size and length of pile, character of subsurface material encountered, hammer characteristics, and required driving resistance.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Pile Driving

Excavation shall be stopped at 1 foot above foundation grade before piles are driven. When pile driving is completed, excavation shall be completed to lines and grades shown. Piles shall be driven to or below the tip elevation indicated on the Drawings. Hammers shall be operated at the rate and efficiency compatible with the project conditions and requirements. A new pile cushion shall be used at the start of driving for each pile and the cushion shall be replaced whenever it has become highly compressed, charred, burned, or deteriorated in any manner during driving.
Each pile shall be driven continuously and without interruption until the required depth of penetration and penetration rate per blow have been attained. If a pile fails to reach the specified tip elevation, the Contractor shall notify the Contracting Officer and perform corrective measures, as directed.

3.1.2 Pre-Drilling

Drilling or augering will be permitted only with the approval of the Contracting Officer. The hole shall be 3 inches less in diameter than the diagonal dimension of the pile and shall be backfilled with granular material after installation of the pile. The drilling or augering shall not be deeper than required to bypass the obstruction documented during pile driving.

3.1.3 Splices

Field splices should be avoided for lengths under 60 feet. When authorized by the Contracting Officer, splices shall be of the full penetration butt-weld type. Unless otherwise authorized by the Contracting Officer, only one splice shall be permitted per length of pile. Splices shall be designed and constructed to maintain the true alignment and position of the pile sections. Splices shall develop the full strength of the pile in both bearing and bending. Proprietary prefabricated splicer sleeves may be used upon prior approval by the Contracting Officer.

3.1.6 Welding

Shop and field welding, qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1.

3.1.7 Tolerances in Driving

Top of pile at elevation of cut off shall be within 6 inches of the location indicated. Additionally, a variation in batter, as measured on

the driven pile, of not more than 1/4 inch per foot of longitudinal axis will be permitted. Manipulation of piles to force them into position will not be permitted. Piles will be checked for heave. Piles found to have heaved shall be redriven to the required point elevation. Piles damaged or driven outside the above tolerances shall be replaced or additional piles driven at locations specified by the Contracting Officer at no expense to the Government.

3.1.8 Cutting off of Piles

Piles shall be cut off at the elevations indicated by a method approved by the Contracting Officer.

-- End of Section --

SECTION 02462

TAPERED STEEL PILES FOR A-FRAME ANCHORAGE

14. 45' LONG CONCRETE TAPERED STEEL PILES

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 36/A 36M	(2003a) Carbon Structural Steel
ASTM A 572/A 572M	(2003a) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 148/A 148M	(2003) Steel Castings, High Strength, for Structural Purposes
ASTM A 252	(1998; R 2002) Welded and Seamless Steel Pipe Piles
ASTM A 722/A 722M	(1998; R 2003) Uncoated High-Strength Steel Bar for Prestressing Concrete
ASTM D 1143	(1981; R 1994e1) Piles Under Static Axial Compressive Load
ASTM D 3689	(1990, R 1995) Individual Piles Under Static Axial Tensile Load
ASTM D 3966	(1990; R 1995) Piles Under Lateral Loads

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2002) Structural Welding Code - Steel
AWS D1.5M/D1.5	(2002) Bridge Welding Code

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Pile Splices; G, DO

Submit detail drawings; with description of field splice procedures, of pile splices prior to fabrication. Submit a plan

for positioning all field and shop splices.

Pile Placement; G, DO

Submit pile placement plan, including proposed procedure for placing concrete pile core, at least 30 days prior to delivery of piles to the job site. Submit details of jetting, predrilling or preaugaring operations, if required, to advance piles at least 30 days prior to delivery of piles to the job site. Submit the proposed sequence for driving all tapered steel piles, including a numbered pile location drawing indicating existing surface grade and tapered steel pile cut-off elevation.

Pile Driving Records; G, DO

Submit pile driving records daily.

SD-03 Product Data

Tapered Steel Piles; G, DO

Submit manufacturer's catalog cuts or similar documentation for Tapered Steel Piles.

Pile Driving Equipment; G, DO

Submit descriptions of pile driving equipment, including caps, leads, cap block cushions and guides at least 30 days prior to commencement of work.

Pile Driving Records; G, DO

Submit the proposed form for compiling pile driving records 30 days prior to commencement of work.

Delivery, Storage, and Handling; G, RO

Submit delivery, storage, and handling plans for piles at least 30 days prior to delivery of piles to the job site.

Pile Tests; G, DO

Submit pile load test plan at least 30 days prior to installing any test piles. Approval of the plan shall not relieve the Contractor of the responsibility for structural and operational adequacies of the testing system.

SD-06 Test Reports

Pile Driving Tests; G, DO

Submit pile driving test data within one (1) day after each test is completed.

Pile Driving Analyzer; G, DO

Submit pile driving analyzer data within one (1) day.

Pile Load Tests; G, DO

Submit four copies of the load test report for each pile tested within one (1) week after the load test is completed.

SD-07 Certificates

Tapered Steel Piles; G, DO

Submit certified mill test reports for Tapered Steel Piles.

SD-08 Manufacturer's Instructions

Tapered Steel Piles; G, DO

Submit tapered steel pile manufacturer's instructions.

SD-13 Records

As-Built Drawings

Submit as-built drawings accurately showing the following: size, length and exact location of all piles driven, including abandoned piles; depth of preaugaring, if any; final pile tip and head elevations; details of A-Frame configurations; pile location plan signed and sealed by a licensed land surveyor including GPS locations of survey markers as indicated on the plans, showing horizontal and vertical alignment deviations and cut-offs, and will include pile heave survey and redrive data.

1.4 DELIVERY, STORAGE, AND HANDLING

Delivery, storage, and handling of materials shall conform to the requirements specified herein and in Section 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS. Plans for the delivery, storage, and handling of piles shall be developed and submitted in accordance with paragraph SUBMITTALS.

1.4.1 Delivery and Storage

Tapered steel piles shall be stacked during delivery and storage so that each pile is maintained in a straight position and is supported every 10 feet or less along its length (ends inclusive) to prevent exceeding the maximum camber or sweep. Piles shall not be stacked more than 5 feet high. Delivery and storage of tapered steel piles shall be in a manner prescribed by the manufacturer.

1.4.2 Handling

Piles shall be lifted using a cradle or multiple points pick-up to ensure that the maximum permissible camber or sweep is not exceeded due to insufficient support, except that a one-point pick-up may be used for lifting piles that are not extremely long into the driving leads. Point pick-up devices shall be of the type that clamp to both pile flanges at each pick-up point. Holes may be burned in the flanges or webs of piles above the cutoff length for lifting piles into the leads. Piles shall not be dragged across the ground. The Contractor shall inspect piles for excessive camber and sweep and for damages before transporting them from the storage area to the driving area and immediately prior to placement in the driving leads. Camber, curvature in the pile in the direction normal to

the pile flanges, shall be measured with the pile flange base laying on a flat surface and shall be the distance between the flange base at the mid-length of the pile and the flat surface. Sweep, curvature in the pile in the direction parallel to the pile flanges, shall be measured with the pile flange tips laying on a flat surface and shall be the distance between the flange tips at the mid-length of the pile and the flat surface. Handling of tapered steel piles shall be in a manner that does not conflict with that prescribed by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

Material orders, material lists and material shipping bills shall conform to the requirements of Section 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS. Concrete shall conform to the requirements of Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE unless otherwise noted. Threaded Reinforcing steel rods shall be ASTM A722 Grade 150ksi and shall conform to the requirements of Section 02390 ANCHORS.

2.1.1 Steel

Steel for Tapered Steel Piles shall conform to ASTM A 572/A 572M Grade 50. Steel for cylindrical pipe sections shall conform to ASTM A252 Gr. 3, minimum yield strength of 45 ksi. Steel for pile points shall conform to ASTM A 148/A 148M.

2.1.2 Tapered Steel Piles

Tapered Steel Piles shall be polygonal in section, having 12 equal sides joined by two or more longitudinal butt welds, and having a top and bottom diameter, length and minimum thickness as shown on the drawings. Lengths of piles shall be determined as specified in paragraph INSTALLATION, subparagraph LENGTHS OF PERMANENT PILES and paragraph PILE TESTS, subparagraph TEST PILES.

2.1.3 Pile Splices

Materials for pile splices shall be cylindrical pipe sections of the diameter and minimum thickness as shown on the drawings. The sections shall be joined with by a 100% butt weld.

2.1.4 Pile Points

A cast steel conical point shall be welded to the bottom of the tapered pile section and shall be provided on all tapered steel piles.

2.1.5 Pile-to-Pile connections for A-Frame Anchorage

Connections and miscellaneous fabrications shall conform to details shown on the drawings.

2.1.6 Concrete

Concrete shall be Class PP except that the concrete shall have a minimum compressive strength of 5000 psi and be as specified in Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE

2.2 FABRICATION

Fabrication shall conform to the requirements shown and as specified herein and in Section 05055A METALWORK FABRICATION, MACHINE WORK, AND MISCELLANEOUS PROVISIONS. Fabrication shall not be in conflict with the manner prescribed by the manufacturer.

2.2.1 Pile Splices

Pile splices shall be fabricated as shown. The top of the tapered section shall be rounded so that the outside diameter will match the outside diameter of the pipe section to be jointed to the tapered steel pile. The sections shall be joined by a 100% butt weld. Splices shall develop 100 percent of the axial capacity of the shell section being spliced. After splicing, deviations in straightness in the undriven portion of pipe shall not exceed 3/8 inch in 40 feet. During welding, use an approved jig or alignment device to maintain the required straightness of pipe. Unless otherwise permitted based on field conditions and approved by the Contracting Officer's Representative, the number and location of splices shall be limited to no more than three splices per pile. Detail drawings of splices shall be submitted in accordance with paragraph 1.3 SUBMITTALS.

2.2.2 Pile Points

Pile points shall be attached to piles as shown. The top of piles shall be ground sufficiently smooth to provide a good welding surface for structural-shape pile caps.

PART 3 EXECUTION

3.1 PILE DRIVING EQUIPMENT

Select the proposed pile driving equipment, including hammers and other required items, and submit complete descriptions of the proposed equipment in accordance with paragraph 1.3 SUBMITTALS. Final approval of the proposed equipment is subject to the satisfactory completion and approval of pile tests. Changes in the selected pile driving equipment will not be allowed after the equipment has been approved except as directed. No additional contract time will be allowed for Contractor proposed changes in the equipment.

3.1.1 Pile Driving Hammers

Pile driving hammers shall be of the impact type. The hammer shall have a delivered energy suitable for the total weight of the pile, the character of subsurface material to be encountered, and the pile capacity to be developed.

3.1.1.1 Impact Hammers

Impact hammers shall be steam, air, or diesel hammers of the single acting, double-acting, or differential acting type. The size or capacity of hammers shall be as recommended by the manufacturer for the pile mass weight and soil formation to be penetrated. Hammers shall be capable of and so demonstrated during the development of refusal criteria, hard driving in excess of 20 blows per inch. Boiler, compressor, or engine capacity shall be sufficient to operate hammers continuously at the full rated speed. Hammers shall have a gage to monitor hammer bounce chamber pressure for diesel hammers or pressure at the hammer for air and steam hammers. This

gage shall be operational during the driving of piles and shall be mounted in an accessible location for monitoring by the Contractor and the Contracting Officer. The driving head shall be designed to properly fit the head of the pile to prevent damage to the top of the pile during driving. Cap block cushions shall be designed to prevent damage to the piles without absorbing an excessive amount of energy. In accordance with paragraph 1.3 SUBMITTALS, submit the following information for each impact hammer proposed:

a. Make and model.

b. Ram weight (pounds).

c. Anvil weight (pounds).

d. Rated stroke (inches).

e. Rated energy range (foot-pounds).

f. Rated speed (blows per minute).

g. Steam or air pressure, hammer, and boiler or compressor (psi).

h. Pile driving cap, make, and weight (pounds).

i. Cushion block dimensions and material type.

j. Power pack description.

3.1.2 Pile Driving Leads

Hammers shall be supported and guided with rigid-frame, fixed extended leads. For driving battered piles, impact hammers shall be supported and guided with three-axis, fixed-extended leads capable of 1 H and 2-1/2 V fore and aft batter and 1 H on 6 V side batter, with 30 degree rotation each side of an axis running along the center line of rotation of the crane through the center line of the leads. Two intermediate supports for the pile in the leads shall be provided to reduce the unbraced length of the pile during driving and pulling.

3.1.3 Pile Extractors

Pile extractors may be vibratory or impact pile driving hammers. Impact hammers are required for pulling piles not extractable with vibratory hammers.

3.2 INSTALLATION

3.2.1 Lengths of Permanent Piles

The lengths of the piles shown are for estimating purposes only. The Contracting Officer will determine the actual lengths of piles required to be driven below cutoff elevation for the various locations in the work and will furnish the Contractor a quantities list indicating lengths and locations of all piles to be installed. These actual lengths will be determined from the results of the pile tests specified in paragraph PILE TESTS. The Contracting Officer will determine the number of overlength piles required to provide for variations in subsurface conditions. Where required bearing and uplift capacities are attainable with piles of lesser

length than those specified, shorter piles may be used subject to prior written approval.

3.2.2 Pile Driving Records

Develop a form for compiling pile driving records which must be approved. Complete and accurate records of the pile driving operations shall be compiled on the approved form and submitted in accordance with paragraph 1.3 SUBMITTALS. Driving records for each pile shall include date driven, pile identification number, pile dimensions, location, top elevation, tip elevation, batter alignment, description of hammer used, number of blows required for each foot of penetration throughout the entire length of the pile and for each inch of penetration in the last foot of penetration, total driving time in minutes and seconds, and any other pertinent information as required or requested such as unusual driving conditions, interruptions or delays during driving, damage to pile resulting from driving, heave in adjacent piles, and depth and description of voids formed adjacent to the pile. Additional data required to be recorded for impact hammers include the rate of hammer operation and the length of the bounce hose. Additional data required to be recorded for vibratory hammers include hammer power pack description, wattage horsepower applied to pile, and hammer operating frequency.

3.2.3 Pile Placement

A pile placement plan which shows the installation sequence and the methods proposed for controlling the location and alignment of piles shall be developed and submitted in accordance with paragraph 1.3 SUBMITTALS. Site preparation and removal of unsuitable material shall be completed in the area prior to the placement of piles for driving. Piles shall be placed accurately in the correct location and alignments, both laterally and longitudinally, and to the batter lines indicated. The Contractor shall establish a permanent base line to provide for inspection of pile placement by the Contracting Officer during pile driving operations. The base line shall be established prior to driving permanent piles and shall be maintained during the installation of the permanent piles. A final lateral deviation from the correct location at the cutoff elevation of not more than 3 inches will be permitted for battered piles. A final variation in alignment of not more then 1/4 inch per foot of longitudinal axis will be permitted. The correct relative position of all piles shall be maintained by the use of templates or by other approved means. Piles not located properly or exceeding the maximum limits for rotation, lateral deviation, or variation in alignment shall be pulled and redriven at as location directed at no additional cost to the Government.

3.2.4 Pile Penetration Criteria

The controlling depth of penetration and a refusal blow count (number of blows required to attain the final inch of penetration) for permanent piles will be determined by the Contracting Officer. The required depth of penetration will be established subsequent to the analysis of pile tests as specified in paragraph PILE TESTS.

3.2.5 Pile Driving

The Contracting Officer shall be notified 30 days prior to the date pile driving is to begin. Piles shall not be driven within 100 feet of concrete less than 7 days old. Permanent and test piles shall be driven with hammers of the same model and manufacturer, same energy and efficiency, and using

the same driving system. Hammers shall be operated at all times at the speed and under the conditions recommended by the manufacturer. Where heave is anticipated, the sequence of installation shall be such that pile heave is minimized by starting pile driving at the center of the group and proceeding outward. Prior to driving and with the pile head seated in the hammer, each pile shall be checked to ensure that it has been aligned correctly. Once pile driving has begun, conditions such as alignment and batter shall be kept constant. The alignment of battered piles shall be checked and monitored during driving with an accurate batter board level and surveying instrument. Each pile shall be driven continuously and without interruption until the required depth of penetration has been attained. Deviation from this procedure will be permitted only when driving is stopped by causes that reasonably could not have been anticipated. A pile that can not be driven to the required depth because of an obstruction, as indicated by a sudden unexplained change in blow count and drifting, shall be pulled and redriven or shall be cut off and abandoned, whichever is directed. After piles are driven, they shall be cutoff as required at the indicated cutoff elevation. Cutoff piles shall be assembled into the A-Frame anchorage as shown. Any voids around piles or abandoned holes for pulled piles shall be backfilled and densified to the same density as the surrounding soil.

3.2.5.1 Splicing Piles

A pile that has not reached the required refusal blow count when the top has been driven to the top elevation shall be spliced as shown and driven to a sufficient depth to develop the required refusal blow count.

3.2.5.2 Jetting

Jetting of piles will not be permitted for tension piles. Jetting shall be used to assist driving compression piles through strata that can not be penetrated practicably by use of the hammer alone when authorized. After the penetration of the strata requiring jetting has been accomplished, jetting shall be discontinued and the driving shall be resumed with the hammer alone. Jetted piles shall be seated by driving not less than 1 foot after jetting has been stopped.

3.2.5.3 Heaved Piles

When driving piles in clusters or under conditions of relatively close spacing, observations shall be made to detect heave of adjacent piles. Heaved piles shall be backdriven to original depth of penetration or refusal blow count without additional cost to the Government.

3.2.5.4 Pulled Piles

Piles damaged or impaired for use during driving shall be pulled and replaced with new piles, or shall be cut off and abandoned and new piles driven as directed without additional cost to the Government. The Contracting Officer may require that any pile be pulled for inspection. Piles pulled as directed and found to be in suitable condition shall be redriven at another location as directed. Piles pulled as directed and found to be damaged shall be replaced by new piles at the Contractor's expense.

3.2.2.5 Placement of Concrete Core

a. All tapered steel piles shall be filled with concrete.

b. Three piles, a compression pile with two adjacent tension piles, as shown on the drawings, shall be considered a "cluster." Five consecutive clusters (i.e., five compression piles and ten tension piles) shall be considered a "group." Do not place concrete in piles for an individual group until all piles for that group have been driven and approved.

c. After all piles for a group have been driven, the Contractor shall inspect each pile by means of a light source lowered to the bottom of the pile. If eye contact with the light source is lost in any pile, that pile will be further tested by means of an inclinometer. Prior to placing concrete, the Contractor shall certify that pile is clear and dry. After the piles have been inspected and found satisfactory, concrete may be placed.

d. To prevent the introduction of material other than concrete from entering driven piles not immediately filled with concrete, each driven pile shall be covered with a manufacturer-approved temporary cap. Before concreting, each pile shall have water and any other materials removed to provide a clean, dry pile. The Contractor immediately prior to filling will reinspect all piles. The piles will be filled with concrete in one continuous operation by a method that will prevent the segregation of ingredients. The rate of concrete placement shall be adjusted to prevent void formation. Concreting operations shall permit the escape of air from the pile during filling.

3.3 FIELD TEST

Pile Tests - Pile driving tests and pile load tests shall be performed as specified. The Contracting Officer will develop the correlation between pile length and pile capacity during the pile driving tests and pile load tests for the selected pile driving system. Based on the correlations developed, the Contracting Officer will determine the pile length for the permanent piles. Changes in the approved pile driving system during or after completion of tests will not be allowed unless additional tests are performed as directed to establish the correlation between length and pile capacity for the proposed changed system. For changes in the approved pile driving system proposed by the Contractor, required additional pile driving tests and pile load tests shall be performed at the Contractor's expense and no additional contract time will be allowed. In accordance with paragraph SUBMITTALS, develop and submit a detailed pile load test plan which shall include drawings as appropriate and contain the following information:

a. Method of reacting static test loads.

b. Method of supporting reference beams.

c. Method of attaching and supporting dial gages for measuring pile movements.

d. Method of applying static test load to piles.

e. Method of setup of secondary measurement system (surveyor's level, laser beam, etc.)

f. Details of strain rod fabrication and installation.

g. Details of loading frame and reaction systems design, including design computations and fabrication details.

h. Calibration curves for the load cell and readout device.

i. Details of inclinometer installation.

Approval of the plan shall not relieve the Contractor of the responsibility for structural and operational adequacies of the testing system.

3.3.1 Test Piles

Test piles shall be of the indicated lengths and shall be placed at the directed locations. Test piles shall be driven with the same equipment specified in paragraph PILE DRIVING EQUIPMENT and in the same manner specified in paragraph DRIVING for permanent piles. The driving record data shall be recorded for each test pile driven. A pile driving analyzer shall be provided and operated as specified by the manufacturer during the driving of each test pile.

3.3.2 Pile Driving Tests

Two pile driving tests shall be performed, one between Stations 37+50 and 40+00, and one between Stations 40+50 and 43+50 or as otherwise directed. The Contracting Officer will be present during each pile driving test. Pile driving tests shall be carried to completion without interruption. Any pile driving test not accomplished in accordance with this specification shall be redone at no additional cost to the Government. Each driving test pile shall be pulled within one (1) day after the completion of that pile driving test, damages documented, and stored at construction site. Pulled test piles shall be removed from the site when directed.

3.3.3 Pile Load Tests

Pile load tests shall be performed under the supervision of a registered professional engineer provided by the Contractor and experienced in conducting pile load tests. Loading frames and equipment for pile load tests shall be ready to be placed in operation as soon as a load test pile has been driven. The loading equipment shall be of sufficient capacity to apply the maximum load specified in a safe manner. Loading of each test pile shall be started when directed. The Contractor shall be responsible for the application of loads. The magnitude of applied loads shall be accurately determined and controlled using a calibrated load cell and readout device. The Contracting Officer, as confirmed by the results of load tests, will determine the design working load. Load test piles indicated or directed to be driven in permanent locations may be incorporated into the work if, after satisfactory completion of load test, they are approved for inclusion in the work. Any pile load test not accomplished in accordance with this specification will be rejected. A new pile load test shall be conducted for each rejected pile load test. The Contractor shall compile a report for each pile load test that shall include, as a minimum, all applicable information required by the specified test.

3.3.3.1 Compressive Load Test

Perform 2 pile compressive load tests, one between Stations 37+50 and 40+00, and one between Stations 40+50 and 43+50 or as otherwise directed, in accordance with ASTM D 1143. A compressive load of 250 tons shall be

applied to each compressive load test pile.

3.3.3.2 Tensile Load Test

Perform 4 pile tensile load tests, two between Stations 37+50 and 40+00, and two between Stations 40+50 and 43+50 or as otherwise directed, in accordance with ASTM D 3689. A tensile load of 100 tons shall be applied to each tensile load test pile.

3.3.3.3 Lateral Load Test

Perform 2 pile lateral load tests, one between Stations 37+50 and 40+00, and one between Stations 40+50 and 43+50 or as otherwise directed, in accordance with ASTM D 3966. Lateral load tests shall consist of jacking two piles apart with a hydraulic jack, with one pile serving as the reaction pile for the other. A lateral load of 100 tons shall be applied to each pair of lateral load test piles. Required movement readings shall be made and recorded for each pile.

-- End of Section --

SECTION 02463A

STEEL SHEET PILING

Item Number 6a: Installed Steel Sheet Piling
Item Number 6b: Pulled Steel Sheet Piling
Item Number 6c: Redriven Steel Sheet Piling

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

This work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 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 6/A 6M	(1995b) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 690/A 690M or equal that provides same corrosion protection	(2000a) High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments

1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Pile Driving Equipment; G, RO

Complete descriptions of sheet piling driving equipment, including hammers, jetting equipment, extractors, protection caps and other installation appurtenances shall be submitted for approval prior to commencement of work.

Pulling and Redriving; G, RO

The proposed method of pulling sheet piling shall be submitted and approved prior to pulling any piling.

SD-02 Shop Drawings

Steel Sheet Piling; G, DO

Detail drawings for sheet piling including fabricated sections shall show complete piling dimensions and details, driving sequence and location of installed piling. Detail drawings shall include details and dimensions of templates and other temporary guide structures for installing piling. Detail drawings shall provide details of the method of handling piling to prevent permanent deflection, distortion or damage to piling interlocks.

SD-06 Test Reports

Interlocked Joint Strength in Tension Test; G, RO

The procedure for testing sheet piling interlocked joint strength in tension shall be submitted and approved prior to testing piling. Sheet piling interlocked joint strength shall be as specified by the steel sheet piling supplier.

Materials Tests

Certified materials tests reports showing that sheet piling and appurtenant metal materials meet the specified requirements shall be submitted for each shipment and identified with specific lots prior to installing materials. Material test reports shall meet the requirements of ASTM A 6/A 6M.

SD-13 Records

Driving

Records of the sheet piling driving operations shall be submitted after driving is completed. These records shall provide a system of identification which shows the disposition of approved piling in the work, driving equipment performance data, piling penetration rate data, piling dimensions and top and bottom elevations of installed piling. The format for driving records shall be as directed.

1.4 DELIVERY, STORAGE AND HANDLING

Materials delivered to the site shall be new and undamaged and shall be accompanied by certified test reports. The manufacturer's logo and mill identification mark shall be provided on the sheet piling as required by the referenced specifications. Sheet piling shall be stored and handled in the manner recommended by the manufacturer to prevent permanent deflection, distortion or damage to the interlocks. Storage of sheet piling should also facilitate required inspection activities. Sheet piling over 80 feet in length shall be handled using a minimum of two pickup points.

PART 2 PRODUCTS

2.1 Steel SHEET PILING

Steel sheet piling shall be hot-rolled steel sections conforming to ASTM A 690/A 690M, with interlocked joint strength in tension as as specified by

the supplier. The steel sheet piling and steel pile properties shown on the plans shall be used to select actual standard steel sections to be installed. The properties shown provide the minimum requirements.The interlocks of sheet piling shall be free-sliding, provide a swing angle suitable for the intended installation but not less than 5 degrees when interlocked, and maintain continuous interlocking when installed. Sheet piling, including special fabricated sections, shall be full-length sections of the dimensions shown. Fabricated sections shall conform to the requirement and the piling manufacturer's recommendations for fabricated sections. Fabricated tees, wyes and cross pieces shall be fabricated of piling sections with a minimum web thickness of 1/2 inch. Sheet piling shall be provided with standard pulling holes. Metalwork fabrication for sheet piling shall be as specified in Section 05055A METALWORK FABRICATION, MACHINE WORK, AND MISCELLANEOUS PROVISIONS.

2.2 APPURTENANT METAL MATERIALS

Metal plates, shapes, bolts, nuts, rivets and other appurtenant fabrication and installation materials shall conform to manufacturer's standards and to the requirements specified in the respective sheet piling standards.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

Requirements for material tests, workmanship and other measures for quality assurance shall be as specified in Section 05055A METALWORK FABRICATION, MACHINE WORK, AND MISCELLANEOUS PROVISIONS.

2.3.1 Materials Tests

Materials tests shall conform to the following requirements. Sheet piling and appurtenant materials shall be tested and certified by the manufacturer to meet the specified chemical, mechanical and section property requirements prior to delivery to the site. Testing of sheet piling for mechanical properties shall be performed after the completion of all rolling and forming operations. Testing of sheet piling shall meet the requirements of ASTM A 6/A 6M.

2.3.2 Interlocked Joint Strength in Tension Test

The interlocked joint strength in tension test shall conform to the piling manufacturer's standard test, include testing at least two 3-inch long coupons taken randomly from different as-produced pilings of each heat and must be approved.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Pile Driving Equipment

Pile driving equipment shall conform to the following requirements.

3.1.1.1 Driving Hammers

Hammers shall be steam, air, or diesel drop, single-acting, double-acting, differential-acting or vibratory type. The driving energy of the hammers shall be as recommended by the manufacturer for the piling weights and subsurface materials to be encountered.

3.1.1.2 Jetting Equipment

When jetting is authorized by the Contracting Officer, the jetting equipment shall have not less than two removable or fixed jets of the water or combination air-water type. Water jets shall be designed so that the discharge volume and pressure are sufficient to freely erode the material under and adjacent to the piling.

3.1.2 Placing and Driving

3.1.2.1 Placing

Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings. Pilings shall be carefully located as shown. Pilings shall be placed plumb with out-of-plumbness not exceeding 1/8 inch per foot of length and true to line. Temporary wales, templates, or guide structures shall be provided to insure that the pilings are placed and driven to the correct alignment. At least two templates shall be used in placing each piling and the maximum spacing of templates shall not exceed 20 feet. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.

3.1.2.2 Driving

Prior to driving pilings in water a horizontal line shall be painted on both sides of each piling, at a fixed distance from the bottom, so that it shall be visible above the water line after installation. This line shall indicate the profile of the bottom elevation of installed pilings and potential problem areas can be identified by abrupt changes in its elevation. Pilings shall be driven with the proper size hammer and by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths. Driving hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer. Caution shall be taken in the sustained use of vibratory hammers when a hard driving condition is encountered to avoid interlock-melt or damages. The use of vibratory hammers should be discontinued and impact hammers employed when the penetration rate due to vibratory loading is one foot or less per minute. A protecting cap shall be employed in driving when using impact hammers to prevent damage to the tops of pilings. Pilings damaged during driving or driven out of interlock shall be removed and replaced at the Contractor's expense. Pilings shall be driven without the aid of a water jet unless otherwise authorized. Authorized jetting shall be performed on both sides of the pilings simultaneously and must be discontinued at least 5 feet before final seating of pilings. Adequate precautions shall be taken to insure that pilings are driven plumb. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb in the plane of the wall the piling being driven shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to insure the plumbness of succeeding pilings. The maximum permissible taper for any tapered piling shall be 1/8 inch per foot of length. Pilings in each run or continuous length of piling wall shall be driven alternately in increments of depth to the required depth or elevation. No piling shall be driven to a lower elevation than those behind it in the same run except when the pilings behind it cannot be driven deeper. If the piling next to the one being driven tends to follow below final elevation, it may be pinned to the next adjacent piling. If obstructions restrict driving a

piling to the specified penetration, the obstructions shall be removed or penetrated with a chisel beam. If the Contractor demonstrates that removal or penetration is impractical, the Contractor shall make changes in the design alignment of the piling structure as directed to insure the adequacy and stability of the structure. Pilings shall be driven to depths shown and shall extend up to the elevation indicated for the top of pilings. Piling driven to rock shall be seated individually on the rock. A tolerance of 2 inches above the indicated top elevation will be permitted. Pilings shall not be driven within 100 feet of concrete less than 7 days old.

3.1.3 Cutting-Off and Splicing

Pilings driven to refusal or to the point where additional penetration cannot be attained and are extending above the required top elevation in excess of the specified tolerance shall be cut off to the required elevation. Pilings driven below the required top elevation and pilings damaged by driving and cut off to permit further driving shall be extended, as required, to the top elevation by splicing when directed at no additional cost to the Government. Pilings adjoining spliced pilings shall be full-length, unless otherwise approved. If splices are allowed in adjoining pilings, the splices must be spaced at least 3 feet apart in elevation. Ends of pilings to be spliced shall be squared before splicing to eliminate dips or camber. Pilings shall be spliced with concentric alignment of the interlocks so that there are no discontinuities, dips or camber at the abutting interlocks. Spliced pilings shall be free sliding and able to obtain the maximum swing with contiguous pilings. The tops of pilings excessively battered during driving shall be trimmed when directed at no cost to the Government. Piling cut-offs shall become the property of the Contractor and shall be removed from the site. The Contractor shall cut holes in pilings for bolts, rods, drains or utilities, as shown, or as directed. All cutting shall be done in a neat and workmanlike manner. A straight edge shall be used in cuts made by burning to avoid abrupt nicks. Bolt holes in steel piling shall be drilled or may be burned and reamed by approved methods which will not damage the surrounding metal. Holes other than bolt holes shall be reasonably smooth and be of proper size for rods and other items to be inserted.

3.1.4 Inspection of Driven Piling

The Contractor shall inspect the interlocked joints of driven pilings extending above ground. Pilings found to be out of interlock shall be removed and replaced at the Contractor's expense.

3.1.5 Pulling and Redriving

In the pulling and redriving of piles as directed, the Contractor shall pull selected pilings, after driving, to determine the condition of the underground portions of pilings. Any piling so pulled and found to be damaged to the extent that its usefulness in the structure is impaired shall be removed and replaced at the Contractor's expense. Pilings pulled and found to be in satisfactory condition shall be redriven when directed.

3.2 REMOVAL

The removal of sheet pilings shall consist of pulling, sorting, cleaning the interlocks, inventorying and storing previously-installed sheet pilings as directed.

3.2.1 Pulling

The method of pulling piling must be approved. Pulling holes shall be provided in pilings, as required. Extractors shall be of suitable type and size. Care shall be exercised during pulling of pilings to avoid damaging piling interlocks and adjacent construction. If the Contracting Officer determines that adjacent permanent construction has been damaged during pulling, the Contractor will be required to repair this construction at no cost to the Government. Pilings shall be pulled one sheet at a time. Pilings fused together shall be separated prior to pulling, unless the Contractor demonstrates, to the satisfaction of the Contracting Officer, that the pilings cannot be separated. The Contractor will not be paid for the removal of pilings damaged beyond structural use due to proper care not being exercised during pulling.

3.2.2 Sorting, Cleaning, Inventorying and Storing

Pulled pilings shall be sorted, cleaned, inventoried and stored by type into groups as:

a. Piling usable without reconditioning.

b. Piling requiring reconditioning.

c. Piling damaged beyond structural use.

-- End of Section --

SECTION 02551

BITUMINOUS PAVING FOR PARKING AREAS

Item Number 29: Bituminous Paving

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29	(1997) Unit Weight and Voids in Aggregate
ASTM C 88	(1999) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	(2002) Materials Finer than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(2001) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	(2003) Specific Gravity and Absorption of Fine Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 183	(2002) Sampling and the Amount of Testing of Hydraulic Cement
ASTM D 5	(1997) Penetration of Bituminous Materials
ASTM D 75	(2003) Sampling Aggregates
ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 242	(2001) Mineral Filler for Bituminous Paving Mixtures

ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 946	(1982; R 1999) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 1250	(1980; R 2002) Petroleum Measurement Tables
ASTM D 1856	(1995; R 2003) Recovery of Asphalt from Solution by Abson Method
ASTM D 2041	(2003) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	(2002) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil, and Rock
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3515	(2001) Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM D 4791	(1999) Flat or Elongated Particles in Coarse Aggregate

AMERICAM ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 226	Viscosity-Graded Asphalt Cement

1.3 SUBMITTALS

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

SD-06 Test Reports

Bituminous Paving Mixture; G, RO

Job-Mix Formula (JMF). Copies of test results.

SD-13 Records

Waybills and Delivery Tickets

Waybills and delivery tickets, during progress of the work.

1.4 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.4.1 General

The bituminous plant shall be of such capacity to produce the quantities of bituminous mixtures required. Hauling equipment, paving machines, rollers, miscellaneous equipment, and tools shall be provided in sufficient numbers and capacity and in proper working condition to place the bituminous paving mixtures.

1.4.2 Mixing Plants

The mixing plant shall be an automatic or semiautomatic, controlled commercially-manufactured unit designed and operated to consistently produce a mixture within the job-mix formula (JMF).

1.4.3 Straightedge

The Contractor shall furnish and maintain at the site, in good condition, one 12-foot straightedge for each bituminous paver. Straightedge shall be made available for use of the Contracting Officer. Straightedges shall be constructed of aluminum or other lightweight metal and shall have blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement.

1.5 WEATHER LIMITATIONS

Unless otherwise directed, bituminous courses shall not be constructed when temperature of the surface of the existing pavement or base course is below 40 degrees F.

1.6 PROTECTION OF PAVEMENT

After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until the pavement has cooled to 140 degrees F.

1.7 GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS

Finished surface of bituminous courses, when tested as specified below, shall conform to gradeline and elevations shown and to surface-smoothness requirements specified.

1.7.1 Plan Grade

The grade of the completed surface shall not deviate more than 0.05 foot from the plan grade.

1.7.2 Surface Smoothness

When a 12-foot straightedge is laid on the surface parallel with the centerline of the paved area or transverse from crown to pavement edge, the surface shall vary not more than 1/4 inch from the straightedge.

1.8 GRADE CONTROL

Lines and grades shall be established and maintained by means of line and grade stakes placed at site of work. Elevations of bench marks used by the Contractor for controlling pavement operations at the site of work will be

determined, established, and maintained by the Contracting Officer. Finished pavement elevations shall be established and controlled at the site of work by the Contractor in accordance with bench mark elevations furnished by the Contracting Officer.

PART 2 PRODUCTS

2.1 Bituminous Paving Mixture, Intermediate Course

The bituminous paving mixture for the intermediate course shall comply with the following gradation and asphalt cement content:

Mix Gradation and Asphalt Cement Content

Sieve Size	Percent Passing
2"	100
1 1/2"	90-100
1"	80-100
1/2"	50-85
No.4	25-60
No.8	20-45
No.50	8-30
No.200	4-7.5

Note: The maximum size of coarse aggregate shall be no more than one-half of the proposed lift thickness.

Asphalt Cement (Percent by Weight of Total Mixture)

4-6

2.2 Bituminous Paving Mixture, Wearing Course

The bituminous paving mixture for the wearing course shall comply with the following gradation and asphalt cement content:

Mix Gradation and Asphalt Cement Content

Sieve Size	Percent Passing
1"	100
3/4"	98-100
1/2"	88-98
3/8"	65-88
No.4	35-65
No.8	25-46
No.16	18-40
No.30	12-30
No.50	10-25
No.200	4-7.5

Note: The maximum size of coarse aggregate shall be no more than one-half of the proposed lift thickness.

Asphalt Cement (Percent by Weight of Total Mixture)

5-7

2.3 Asphalt Cement

Asphalt cement shall consist of Grade AC-20 complying with AASHTO M 226, Table 2.

PART 3 EXECUTION

3.1 BASE COURSE CONDITIONING

The surface of the aggregate base course will be inspected for adequate compaction and surface tolerances specified in Section 02233. Unsatisfactory areas shall be corrected.

3.2 TRANSPORTATION OF BITUMINOUS MIXTURE

Transportation from the paving plant to site shall be in trucks having tight, clean, smooth beds lightly coated with an approved releasing agent to prevent adhesion of the mixture to the truck bodies. Excessive releasing agent shall be drained prior to loading. Each load shall be covered with canvas or other approved material of ample size to protect the mixture from the weather and to prevent loss of heat. Loads that have crusts of cold, unworkable material or that have become wet will be rejected. Hauling over freshly placed material will not be permitted.

3.3 SURFACE PREPARATION OF UNDERLYING COURSE

Prior to placing of the intermediate or wearing course, the underlying course shall be cleaned of all foreign or objectionable matter with power brooms and hand brooms.

3.4 PRIME COAT

Surfaces of previously-constructed aggregate base course shall be sprayed with a coat of bituminous material conforming to Section 02748A BITUMINOUS TACK AND PRIME COATS.

3.5 TACK COAT

Contact surfaces of previously-constructed pavement, curbs, manholes, and other structures shall be sprayed with a thin coat of bituminous material conforming to Section 02748A BITUMINOUS TACK AND PRIME COATS.

3.6 PLACING

Bituminous courses shall be constructed only when the aggregate base course or existing pavement has no free water on the surface. Bituminous mixtures shall not be placed without ample time to complete spreading and rolling during daylight hours, unless approved, satisfactory artificial lighting is provided.

3.6.1 Offsetting Joints

The wearing course shall be placed so that longitudinal joints of the wearing course will be offset from joints in the intermediate course by at least 1 foot. Transverse joints in the wearing course shall be offset by at least 2 feet from transverse joints in the intermediate course.

3.6.2 General Requirements for Use of Mechanical Spreader

The range of temperatures of mixtures, when dumped into the mechanical spreader, shall be as determined by the Contracting Officer. Mixtures having temperatures less than 225 degrees F when dumped into the mechanical spreader shall not be used. The mechanical spreader shall be adjusted and the speed regulated so that the surface of the course being laid will be smooth and continuous without tears and pulls, and of such depth that, when compacted, the surface will conform to the cross section indicated. Placing with respect to center line areas with crowned sections or high side of areas with one-way slope shall be as directed. Each lot of material placed shall conform to requirements specified herein. Placing of the mixture shall be as nearly continuous as possible, and speed of placing shall be adjusted, as directed, to permit proper rolling. When segregation occurs in the mixture during placing, the spreading operation shall be suspended until the cause is determined and corrected.

3.6.3 Placing Strips Succeeding Initial Strips

In placing each succeeding strip after initial strip has been spread and compacted as specified below, the screed of the mechanical spreader shall overlap the previously placed strip 2 to 3 inches and be sufficiently high so that compaction produces a smooth dense joint. Mixture placed on the edge of a previously placed strip by the mechanical spreader shall be pushed back to the edge of the strip by use of a lute. Excess mixture shall be removed and wasted.

3.6.4 Handspreading in Lieu of Machine Spreading

In areas where the use of machine-spreading is impractical, the mixture shall be spread manually. Spreading shall be in a manner to prevent segregation. The mixture shall be spread uniformly, with hot rakes, in a loose layer of thickness that, when compacted, will conform to required grade, density, and thickness.

3.7 COMPACTION OF MIXTURE

Rolling shall begin as soon after placing as the mixture will bear a roller without undue displacement. Delays in rolling freshly-spread mixture will not be permitted. After initial rolling, preliminary tests of crown, grade, and smoothness shall be made by the Contractor. Deficiencies shall be corrected so that the finished course will conform to requirements for grade and smoothness specified herein. After the Contractor is assured of meeting crown, grade, and smoothness requirements, rolling shall be continued until a mat density of 97.0 to 100.0 percent and a joint density of 95.0 to 100.0 percent of density of laboratory-compacted specimens of the same mixture is obtained. Places inaccessible to rollers shall be thoroughly compacted with hot hand tampers.

3.7.1 Correcting Deficient Areas

Mixtures that become contaminated or are defective shall be removed to the full thickness of the course. Edges of the area to be removed shall be cut so that sides are perpendicular and parallel to the direction of traffic and so that the edges are vertical. Edges shall be sprayed with bituminous materials conforming to Section 02748A BITUMINOUS TACK AND PRIME COATS. Fresh paving mixture shall be placed in the excavated areas in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. Paving mixture shall be compacted to the density specified

herein. Skin patching of an area that has been rolled shall not be permitted.

3.8 JOINTS

3.8.1 General

Joints between old and new pavements, between successive work days, or joints that have become cold (less than 175 degrees F) shall be made to insure continuous bond between the old and new sections of the course. All joints shall have the same texture and smoothness as other sections of the course. Contact surfaces of previously-constructed pavements coated by dust, sand, or other objectionable material shall be cleaned by brushing or shall be cut back as directed. When directed by the Contracting Officer, the surface against which new material is placed shall be sprayed with a thin, uniform coat of bituminous material conforming to Section 02748A BITUMINOUS TACK AND PRIME COATS. Bituminous material shall be applied far enough in advance of placement of fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of surfaces not intended for receiving bitumen spray/coating.

3.8.2 Transverse Joints

The roller shall pass over the unprotected end of a strip of freshly-placed material only when placing is discontinued or delivery of the mixture is interrupted to the extent that the material in place may become cold. In all cases, prior to continuing placement, the edge of previously-placed pavement shall be cut back to expose an even, vertical surface for full thickness of the course.

In continuing placement of a strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint, after rolling, that conforms to the required density and smoothness specified herein.

3.8.3 Longitudinal Joints

Edges of a previously-placed strip shall be prepared such that the pavement in, and immediately adjacent to, the joint between this strip and the succeeding strip meets the requirements for grade, smoothness, and density specified herein.

-- End of Section --

SECTION 02620A

SUBDRAINAGE SYSTEM

Payment Item No. 31 - Subdrains

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 190	(1995) Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 252	(1996) Corrugated Polyethylene Drainage Tubing
AASHTO M 294	(2003) Corrugated Polyethylene Pipe, 305-to 915-mm (12-to 36 in.) Diameter

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 27	(2003) Steel Castings, Carbon, for General Application
ASTM A 47	(1999) Ferritic Malleable Iron Castings
ASTM A 48	(1994ael) Gray Iron Castings
ASTM A 123	(2003) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 227	(1999) Steel Wire, Cold-Drawn for Mechanical Springs
ASTM A 229	(1999) Steel Wire, Oil-Tempered for Mechanical Springs
ASTM A 760	(2001a) Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A 762	(2000) Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM B 745	(1997) Corrugated Aluminum Pipe for Sewers and Drains
ASTM C 4	(2003) Clay Drain Tile
ASTM C 14	(2003) Concrete Sewer, Storm Drain, and

	Culvert Pipe
ASTM C 55	(2003) Concrete Brick
ASTM C 62	(2001) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 139	(2003) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 150	(2002ael) Portland Cement
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 412	(2003) Concrete Drain Tile
ASTM C 425	(2002) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 444	(2003) Perforated Concrete Pipe
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 654	(2003) Porous Concrete Pipe
ASTM C 700	(2002) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2751	(1996a) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(2000) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a; R 2003) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3753	(1999) Glass-Fiber-Reinforced Polyester Manholes
ASTM D 5034	(1995; R 2001) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM F 405	(1997) Corrugated Polyethylene (PE) Tubing and Fittings
ASTM F 667	(1997) Large Diameter Corrugated

	Polyethylene Tubing and Fittings
ASTM F 758	(1995; R 2000) Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F 949	(2003) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings

1.2 SUBMITTALS

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

SD-07 Certificates

Filter Fabric; G, RO.
Pipe for Subdrains; G, RO.

Certifications from the manufacturers attesting that materials meet specification requirements. Certificates are required for drain pipe, drain tile, fittings, and filter fabric.

1.3 DELIVER, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with minimum handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. During shipment and storage, filter fabric shall be wrapped in burlap or similar heavy duty protective covering. The storage area shall protect the fabric from mud, soil, dust, and debris. Filter fabric materials that are not to be installed immediately shall not be stored in direct sunlight. Plastic pipe shall be installed within 6 months from the date of manufacture unless otherwise approved.

1.3.2 Handling

Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried and not dragged to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR SUBDRAINS

Pipe for subdrains shall be of the types and sizes indicated.

2.1.1 Plastic Pipe

Plastic pipe shall contain ultraviolet inhibitor to provide protection from exposure to direct sunlight.

2.1.1.1 Corrugated Polyethylene (PE) Pipe and Fittings

Use ASTM F 405 for pipes 3 to 6 inches in diameter, inclusive. Fittings shall be manufacturer's standard type and shall conform to the indicated specification.

2.1.1.2 Pipe Perforations

Water inlet area shall be a minimum of 0.5 square inch per linear foot. Manufacturer's standard perforated pipe which essentially meets these requirements may be substituted with prior approval of the Contracting Officer.

a. Circular Perforations in Plastic Pipe: Circular holes shall be cleanly cut not more than 3/8 inch) or less than 3/16 inch in diameter and arranged in rows parallel to the longitudinal axis of the pipe. Perforations shall be approximately 3 inches center-to-center along rows. The rows shall be approximately 1-1/2 inches apart and arranged in a staggered pattern so that all perforations lie at the midpoint between perforations in adjacent rows. The rows shall be spaced over not more than 155 degrees of circumference. The spigot or tongue end of the pipe shall not be perforated for a length equal to the depth of the socket, and perforations shall continue at uniform spacing over the entire length of the pipe.

b. Slotted Perforations in Plastic Pipe: Circumferential slots shall be cleanly cut so as not to restrict the inflow of water and uniformly spaced along the length and circumference of the tubing. Width of slots shall not exceed 1/8 inch nor be less than 1/32 inch. The length of individual slots shall not exceed 1-1/4 inches on 3 inch diameter tubing, 10 percent of the tubing inside nominal circumference on 4 to 8 inch diameter tubing, and 2-1/2 inches on 10 inch diameter tubing. Rows of slots shall be symmetrically spaced so that they are fully contained in 2 quadrants of the pipe. Slots shall be centered in the valleys of the corrugations of profile wall pipe.

2.2 FILTER FABRIC

Filter fabric shall be a pervious sheet of polyester, nylon, or polypropylene filaments woven or otherwise formed into a uniform pattern with distinct and measurable openings. The filter fabric shall provide an equivalent opening size (AOS) no finer than the US Standard Sieve No. 70 and no coarser than the US Standard Sieve No. 30. AOS is defined as the number of the US Standard sieve having openings closest in size to the filter fabric openings. The percent open area provided shall not be less than 4 percent and not more than 10 percent. Percent open area is defined

as the summation of open areas divided by the total area of the filter fabric and expressed as a percent. The fabric shall have a minimum physical strength of pounds per inch in any direction when tested in accordance with ASTM D 5034 using the grab test method with 1 square inch jaws and a constant rate of travel of 12 inches per minute. Elongation at failure shall be between 30 and 70 percent. The fabric shall be constructed so that the filaments will retain their relative position with respect to each other. The edges of the fabric shall be selvaged or otherwise finished to prevent the outer material from pulling away from the fabric.

2.3 SUBDRAIN FILTER AND BEDDING MATERIAL

Subdrain filter and bedding material shall be washed sand, sand and gravel, crushed stone, crushed stone screenings, or slag composed of hard, tough, durable particles free from adherent coatings. Filter material shall not contain corrosive agents, organic matter, or soft, friable, thin, or elongated particles and shall be evenly graded between the limits specified in TABLE I. Gradation curves will exhibit no abrupt changes in slope denoting skip or gap grading. Filter materials shall be clean and free from soil and foreign materials. Filter blankets found to be dirty or otherwise contaminated shall be removed and replaced with material meeting the specific requirements, at no additional cost to the Government.

TABLE I. FILTER GRADATION

Sieve Designation	Percent by Weight Passing Gradation
ASTM C 33	Table 2, Size 56

PART 3 EXECUTION

3.1 EXCAVATION AND BEDDING FOR SUBDRAIN SYSTEMS

Trenching and excavation, including the removal of rock and unstable material, shall be in accordance with Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Bedding material shall be placed in the trench as indicated or as required as replacement materials used in those areas where unstable materials were removed. Compaction of the bedding material shall be as specified for cohesionless material in Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.2 CLEANOUTS

3.2.1 Flushing and Observation Risers

Cleanouts and observation riser pipes with caps shall be installed at the locations indicated. Risers shall be constructed corrugated metal pipe. Joining of riser pipes to the subdrain system shall be as indicated.

3.3 INSTALLATION OF FILTER FABRIC AND PIPE FOR SUBDRAINS

3.3.1 Installation of Filter Fabric

3.3.1.1 Overlaps on Perforated or Slotted Pipes

One layer of filter fabric shall be wrapped around perforated or slotted collector pipes in such a manner that longitudinal overlaps of fabric are in unperforated or unslotted quadrants of the pipes. The overlap shall be at least 2 inches. The fabric shall be secured to the pipe in such a manner that backfill material will not infiltrate through any fabric overlaps.

3.3.1.2 Trench Lining and Overlaps

Trenches to be lined with filter fabric shall be graded to obtain smooth side and bottom surfaces so that the fabric will not bridge cavities in the soil or be damaged by projecting rock. The fabric shall be laid flat but not stretched on the soil, and it shall be secured with anchor pins. Overlaps shall be at least 18 inches, and anchor pins shall be used along the overlaps.

3.3.2 Installation of Pipe for Subdrains

3.3.2.1 Pipelaying

Each pipe shall be carefully inspected before it is laid. Any defective or damaged pipe shall be rejected. No pipe shall be laid when the trench conditions or weather is unsuitable for such work. Water shall be removed

from trenches by sump pumping or other approved methods. The pipe shall be laid to the grades and alignment as indicated. The pipe shall be bedded to the established gradeline. Perforations shall be centered on the bottom of the pipe. Pipes of either the bell-and-spigot type or the tongue-and-groove type shall be laid with the bell or groove ends upstream. All pipes in place shall be approved before backfilling.

3.4 CONNECTION TO STORM DRAINAGE SYSTEM

Connection to the storm drainage system shall be made using a pipe saddle installed as recommended by the saddle manufacturer.

3.5 INSTALLATION OF FILTER MATERIAL AND BACKFILLING FOR SUBDRAINS

After pipe for subdrains has been laid, inspected, and approved, filter material shall be placed around and over the pipe to the depth indicated. The filter material shall be placed in layers not to exceed 8 inches thick, and each layer shall be thoroughly compacted by mechanical tampers or rammers to obtain the required density. Compaction of filter material and the placement and compaction of overlying backfill material shall be in accordance with the applicable provisions specified in Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

-- End of Section --

SECTION 02630

STORM-DRAINAGE SYSTEM

Item Number 15: 15-Inch RCP
Item Number 17: 36-Inch RCP
Item Number 18: 60-Inch RCP
Item Number 19: 72-Inch RCP
Item Number 21: Inlets
Item Number 22a: Flap Valves, 15-Inch
Item Number 22c: Flap Valves, 30-Inch
Item Number 22e: Flap Valve, 60-Inch
Item Number 22f: Flap Valve, 72-Inch
Item Number 22h: Flap Valve, 5.5' by 8.25'
Item Number 22i: Flap Valve, 7' by 9'

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to construct the storm drainage system, including pipe, precast concrete inlets and flap valves. Excavation, trenching and backfilling requirements for storm drainage systems are included in Section 02222 Excavation, Trenching, and Backfilling for Utilities Systems.

1.2 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 48	(2000) Gray Iron Castings
ASTM A 123	(2002) Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Hardware
ASTM A 536	(1984; R 1999el) Ductile Iron Castings
ASTM B 26	(2003) Aluminum-Alloy Sand Castings
ASTM C 76	(2003) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 270	(2003) Mortar for Unit Masonry
ASTM C 443	(2002) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(2003) Precast Reinforced Concrete Manhole Sections
ASTM D 1056	(2000) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2167	1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

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

1.3 SUBMITTALS

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

SD-04 Drawings

Detail Drawings for Flap valves; G RD

Detail drawings consisting of a complete list of equipment and materials. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances

for maintenance and operation.

SD-06 Manufacturer's Instructions

Placing Pipe; G, RO

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

SD-07 Certificates

Determination of Density; G, RO

Frame and Cover for Gratings; G, RO

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 III.

2.2 DRAINAGE STRUCTURES

2.2.1 Precast Reinforced Concrete

Precast reinforced concrete shall comply with ASTM C 478 and Section 03425 PRECAST CONCRETE.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 3000 psi concrete under Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring or as indicated on the Contract Drawings. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

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

2.3.3 Precast Reinforced Concrete Inlets

Precast reinforced concrete inlets shall conform to ASTM C 478. Joints between precast concrete risers and tops shall be made with flexible watertight, rubber-type gaskets meeting the requirements of paragraph JOINTS.

2.3.4 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 shall be as indicated in the Contract Drawings.

2.3.5 Flap Valves

Flap valves shall be of the sizes indicated and shall conform to the requirements specified. The Flap valves will be either the cast iron or the reinforced plastic type.

2.3.6 Joints

2.3.6.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe. Rubber-type gaskets shall conform to ASTM C 443. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.
b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished if specifically approved.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS: Flap Valves: Frames, Doors, Seals and Hinges

3.1.1 Cast Iron Flap valves

The flap valve will be flange-framed with resilient seal. It will be specifically designed for pump discharge service. The body will be cast iron ASTM A-126B. The flange will be faced and drilled for pipe flange mounting. A resilient seat, neoprene will be bonded in a groove machined in the body to provide a wide contact surface for the seat machined in the cover. The cover, or flap, will be cast iron, ASTM A126-B, with spherically dished design to withstand maximum operating loads. Severe pump discharge applications may require high-test cast iron, ASTM A126-C, or ductile iron, ASTM A536 for the cover. The hinge arms will be high-tensile bronze ASTM B584-CA865. The hinge pins, designed in double shear, will be silicon bronze, ASTM B98-CA655 or Type 304 stainless steel. Each hinge arm will have two pivot points, an adjustable lower pivot with limited rotation and a threaded upper hinge post to adjust flap valve sensitivity. A lubrication fitting will be supplied for each pivot.

3.1.2 Reinforced Plastic Flap Valves

3.1.2.1 Reinforced Plastic Frames

Carbon steel, flame zinc sprayed (4 to 6 mils) and epoxy coated (minimum 14 mils DFT) or 316L stainless steel frames. Sizes 24 inches and smaller shall be non-metallic frames.

3.1.2.2 Reinforced Plastic Doors

Door shall be constructed from a reinforced rigid composite plastic

material, having a minimum thickness of 1/8 inch. Slide (disc) shall have internal matrix of carbon steel of suitable strength for the specified device. The door outer surface skins shall be a homogeneous plastic material having extremely high tensile and impact strength, be nontoxic and shall be stabilized against ultraviolet light. The plastic material shall be an Aramid fiber from the Kevlar family of fibers, and have the following minimum properties:

Properties Table

Tensile Strength	12,500 psi
Young's Modulus	1,200,000 psi
Flexural Strength	18,000 psi
Flexural Modulus	1,400,000 psi
Compressive Strength	11,000 psi
Impact Strength	40.3 x 1,000,000 erg
Water Absorption	0.38%
Specific Gravity	1.72
Coefficient of Thermal Expansion	0.000016 per C
Heat Distortion Point	80 degrees C ASTM D648
Low Temperature Impact Strength	93% @-20C
Notch Sensitivity	Not notch sensitive
Weathering Properties	Excellent
Fire Resistance	Class 1 spread of flame, Rating BS476: Part 1: 1953 self-extinguishing, ASTM D 635 - 56R
Chemical Resistance	Organics, Alkalines, Ozone (2 to 3 PPM)

Rigid polyurethane foam shall be used as filler between the steel grid reinforcing system and shall be a minimum of 7 lb density per cubic foot. The gate shall be designed to limit the deflection to a maximum of 1/1000 of the span under design head conditions based upon horizontal support members only. The Contractor shall submit drawings and comprehensive design criteria from manufacturer to substantiate that the required deflection figure for each door has been achieved. Comprehensive safety factor calculations shall include bending moments, buckling stress, bonding stress with thermal expansion factors suitable for referenced in NASA CR-1457, "Manual for Plates and Shells", et. al. Safety factors shall be calculated for the door under maximum head. Sizes 24 inches and smaller shall be all reinforced plastic doors per specification.

3.1.2.3 Seals

Resilient seals for flap valves shall be of natural or synthetic rubber. Reclaimed rubber shall not be used. Rubber compounds shall contain not more than 1.5 parts of wax per 100 parts of rubber hydrocarbon. Rubber compounds shall be free of vegetable oils, vegetable-oil derivatives, animal fats, and animal oils. Rubber seals shall be resistant to microbiological attack, copper poisoning, and ozone attack. The design of the seal shall be such as to provide for the minimum leakage as specified. Seals shall be mounted on the frame

and shall be held securely in place with a retainer bar bolted to the frame.

3.1.2.3.1 Material Tests

Rubber compounds shall be capable of withstanding an ozone resistance test when tested in accordance with ASTM D 1149. The tests shall be conducted on an unstressed sample for 70 hr at 104 degrees F without visible cracking in the surfaces of the test samples after the tests. Rubber compounds shall have less than 2 percent volume increases when tested in accordance with ASTM D 471 after being immersed in distilled water at 73.4 degrees F, plus or minus 2 degrees F for 70 hr.

3.1.2.4 Hinge Assemblies

a. Rectangular Hinge Assemblies: Double hung arrangement, 304 stainless steel adjustable brackets, links and pins, oilight bronze bushes and washers.
b. Circular Hinge Assemblies: Single hinge arrangement, composite plastic materials for hinge bodies, 304 stainless steel pin, washers and split pins.

3.1.2.5 Manufacturers’ guarantee

The Manufacturer shall guarantee trouble-free operation for a period of (10) years. If the Owner and his engineer are not completely satisfied with the performance of the products, the Manufacturer shall remedy the problem at no cost or refund the purchase cost upon return of the equipment. When installed and operated as recommended by the manufacturer.

3.2 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 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS and the requirements specified below.

3.2 BEDDING

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

3.4 PLACING PIPE

Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. 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. All pipe in place shall be inspected before backfilling, and those pipes damaged during placement shall be removed and replaced.

3.4.1 Concrete 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.

3.5 JOINTS

3.5.1 Concrete

3.5.1.1 Cement-Mortar Bell-and-Spigot Joint

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

3.6 DRAINAGE STRUCTURES

3.6.1 Inlets

Construction shall be of reinforced concrete, or precast reinforced concrete, complete with frames and covers or gratings.

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 not exceeding 12 inches. 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 not exceeding 12 inches.

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 not less than 90 percent of maximum density for cohesive material and not less than 95 percent of maximum density for cohesionless material.

3.7.5 Determination of Density

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

calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.7 PIPELINE TESTING

Lines shall be tested for leakage by exfiltration tests. Prior to testing for leakage 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. 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 reestablished. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by the exfiltration test shall not exceed 0.2 gallons per inch in diameter per 100 feet of pipeline per hour. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correcting, and retesting shall be made at no additional cost to the Government.

3.7.1 FIELD LEAKAGE TEST – FLAP VALVES

A field leakage test shall be performed after installation of the flap valves. The manufacturer shall be notified of the test in sufficient time to enable him to have a representative present at the test site. After all adjustments have been made and the mechanisms properly lubricated, each gate slide shall be operated through one complete cycle as a final check on proper operation before starting the leakage test. Seating and unseating heads shall be measured from the top surface of the water to the center of the gate.

3.8 PAINTING AND FINISHING – Flap Valves

Unless otherwise specified, all exposed ferrous metal not factory finished shall be painted as specified in Section 09900 PAINTING, GENERAL. No factory finished equipment or appurtenance shall be painted except that damaged factory finishes shall be retouched in an acceptable manner with paint obtained from the manufacturer. Nameplates shall not be covered with paint but shall be cleaned and legible at completion of the work.

-- End of Section

SECTION 02731

AGGREGATE SURFACE COURSE

Item Number 43: Aggregate for Overlook

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 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 117	(2003) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(2003) Sampling Aggregates
ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM E 11 (2001) Wire-Cloth Sieves for Testing Purposes

1.3 SUBMITTALS

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

SD-03 Product Data

Aggregate Surface Course; G, RO

Submit product data 30 days before start of work.

Equipment; G, RO

Submit a list of proposed equipment to be used, including descriptive data, at least 3 days prior to starting work.

SD-06 Test Reports

Sampling and Testing; G, RO

Submit calibration curves and related test results prior to using the device or equipment being calibrated. Submit copies of field test results within 24 hours after the tests are performed. Submit test results from samples not less than 30 days before material is required for the work. Submit results of laboratory tests for quality control purposes prior to using the material.

1.4 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.4.1 Subgrade

For this section only, subgrade shall refer to the subbase placed under Section 02233 DENSE-GRADED AGGREGATE BASE COURSE.

1.4.2 Degree of Compaction

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

1.5 WEATHER LIMITATIONS

Aggregate surface courses shall not be constructed when the ambient temperatures is below 35 degrees Fahrenheit and on subgrades that are frozen or contain frost. It shall be the responsibility of the Contractor to protect, by approved method or methods, all areas of surfacing that have not been accepted by the Contracting Officer. Surfaces damaged by freeze, rainfall, or other weather conditions shall be brought to a satisfactory condition by the Contractor.

1.6 EQUIPMENT

All plant, equipment, and tools used in the performance of the work covered by this section will be subject to approval by the Contracting Officer before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, and meeting the grade controls and thickness controls requirements set forth herein.

PART 2 PRODUCTS

2.1 AGGREGATE SURFACE COURSE

Aggregate for Overlook shall consist of clean, sound, durable particles of crushed limestone or traprock. Aggregates shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign materials. The Contractor shall be responsible for obtaining materials that meet the specification and can be used to meet the grade requirements specified herein after all compaction and proof rolling operations have been completed.

2.1.1 Coarse Aggregates

The material retained on the No. 4 sieve shall be known as coarse aggregate. Coarse aggregates shall be reasonably uniform in density and quality. The coarse aggregate shall have a percentage of wear not to exceed 50 percent after 500 revolutions as determined by ASTM C 131. The amount of flat and/or elongated particles shall not exceed 20 percent. A flat particle is one having a ratio of width to thickness greater than three; an elongated particle is one having a ratio of length to width greater than three. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the requirements set forth herein.

2.1.2 Fine Aggregates

The material passing the No. 4 sieve shall be known as fine aggregate. Fine aggregate shall consist of screenings, sand or other finely divided mineral matter that is processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

Gradation requirements specified in TABLE I shall apply to the completed aggregate surface. It shall be the responsibility of the Contractor to obtain materials that will meet the gradation requirements after mixing, placing, compacting, and other operations. TABLE I shows permissible gradings for granular material used in aggregate surface roads and airfields. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION FOR AGGREGATE SURFACE COURSES

Sieve Designation	Percentage by Weight Passing Sieve
3/4 in.	100
1/2 in.	90-100
3/8 in.	80-95
No. 4	40-60

TABLE I. GRADATION FOR AGGREGATE SURFACE COURSES

Sieve Designation	Percentage by Weight Passing Sieve
No. 8	25-40
No. 16	15-25
No. 30	10-20
No. 50	5-15
No. 100	5-15
No. 200	0-10

2.2 LIQUID LIMIT AND PLASTICITY INDEX REQUIREMENTS

The portion of the completed aggregate surface course passing the No. 40 sieve shall have a maximum liquid limit of 35 and a plasticity index of 4 to 9.

PART 3 EXECUTION

Any specific requirements of the sections in which base courses are constructed shall supercede the following requirements.

3.1 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory or by the Contractor, subject to approval. If the Contractor elects to establish its own testing facilities, approval of such facilities will be based on compliance with ASTM D 3740. No work requiring testing will be permitted until the Contractor's facilities have been inspected and approved.

3.1.1 Sampling

Sampling for material gradation, liquid limit, and plastic limit tests shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

3.1.2 Testing

3.1.2.1 Gradation

Aggregate gradation shall be made in conformance with ASTM C 117, ASTM C 136, and ASTM D 422. Sieves shall conform to ASTM E 11.

3.1.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

3.1.2.3 Field Density Tests

Density shall be measured in the field in accordance with ASTM D 2922. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted, if necessary, using only the sand cone method as described in paragraph Calibration of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and when

using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017.

3.1.2.4 Wear Test

Wear tests shall be made in conformance with ASTM C 131.

3.1.3 Testing Frequency

3.1.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Gradation.

b. Liquid limit and plasticity index.

d. Wear.

3.1.3.2 In-Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted GCA. Samples shall be taken and tested at the rates indicated.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Sieve Analysis shall be performed for every 500 tons, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

3.1.4 Approval of Materials

The source of the material to be used for producing aggregates shall be selected 60 days prior to the time the material will be required in the work. Approval of sources not already approved by the Corps of Engineers will be based on an inspection by the Contracting Officer. Tentative approval of materials will be based on appropriate test results on the aggregate source. Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted surface course.

3.2 GENERAL REQUIREMENTS

When the surface course is constructed using more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control.

Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.3 PREPARATION OF UNDERLYING COURSE SUBGRADE

The subgrade, including shoulders, shall be cleaned of all foreign substances. At the time of surface course construction, the subgrade shall contain no frozen material. Ruts or soft yielding spots in the subgrade areas having inadequate compaction and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade and recompacting to density requirements specified in Section 02233 DENSE-GRADED AGGREGATE BASE COURSE. The completed subgrade shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the surface course is placed.

3.4 GRADE CONTROL

During construction, the lines and grades including crown and cross slope indicated for the aggregate surface course shall be maintained by means of line and grade stakes placed by the Contractor. The finished and completed surface course shall conform to the lines, grades, and cross sections shown on the plans.

3.5 MIXING AND PLACING MATERIALS

The materials shall be mixed and placed to obtain uniformity of the material and a uniform optimum water content for compaction. The Contractor shall make adjustments in mixing, placing procedures, or in equipment to obtain the true grades, to minimize segregation and degradation, to obtain the desired water content, and to ensure a satisfactory surface course.

3.6 LAYER THICKNESS

The aggregate material shall be placed on the subgrade in layers of uniform thickness. When a compacted layer of 6 inches or less is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

3.7 COMPACTION

Each layer of the aggregate surface course shall be compacted with approval compaction equipment. The water content during the compaction procedure shall be maintained at optimum or at the percentage specified by the Contracting Officer. In locations not accessible to the rollers, the mixture shall be compacted with mechanical tampers. Compaction shall continue until each layer through the full depth is compacted to at least 100 percent of laboratory maximum density. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked to produce a satisfactory material.

3.8 PROOF ROLLING

Proof rolling of the areas designated shall be in addition to compaction specified above and shall consist of application of 30 coverages with a heavy rubber-tired roller having four tires abreast with each tire loaded

to 30,000 pounds and tires inflated to 150 pounds per square inch. In the areas designated, proof rolling shall be applied to the top lift of layer on which surface course is laid and to each layer of the base course. Water content of the lift of the layer on which the surface course is placed and each layer of the aggregate surface course shall be maintained at optimum or at the percentage directed from the start of compaction to the completion of a proof rolling. Materials in the aggregate surface course or underlying materials indicated unacceptable by the proof rolling shall be removed and replaced, as directed, with acceptable materials.

3.9 EDGES OF AGGREGATE-SURFACED ROAD

Approved material shall be placed along the edges of the aggregate surface course in such quantity as to compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least 1 foot of shoulder width shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the surface course.

3.10 THICKNESS CONTROL

The completed thickness of the aggregate surface course shall be within 1/2 inch, plus or minus, of the thickness indicated on plans. The thickness of the aggregate surface course shall be measured at intervals in such manner that there will be a thickness measurement for at least each 500 square yards of the aggregate surface course. The thickness measurement shall be made by test holes at least 3 inches in diameter through the aggregate surface course. When the measured thickness of the aggregate surface course is more than 1/2 inch deficient in thickness, the Contractor, at no additional expense to the Government, shall correct such areas by scarifying, adding mixture of proper gradation, reblading, and recompacting, as directed. Where the measured thickness of the aggregate surface course is more than 1/2 inch) thicker than that indicated, it shall be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements determined as specified above, but shall be within 1/4 inch of the thickness indicated. When the average job thickness fails to meet this criterion, the Contractor shall, at no additional expense to the Government, make corrections by scarifying, adding or removing mixture of proper gradation, and reblading and recompacting, as directed.

3.11 MAINTENANCE

Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any area of aggregate surface course that is damaged shall be reworked or replaced as necessary to comply with this specification.

Any vegetation within preserved areas damaged by the work under this section, as determined by the Contracting Officer, shall be replaced immediately after the completion of the work at no additional cost to the Government.

3.12 RESTORATION AND CLEAN UP

When aggregate surface course operations have been completed, the Contractor shall restore any damaged areas to their original conditions.

Work areas shall also be cleaned up, including the removal of any excess

materials. The Contractor shall remove damaged, excess, and waste materials from the Project Site and dispose of the materials off Government property.

-- End of Section --

SECTION 02732

OVERLOOK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Under this section, the Contractor shall create an Overlook in the location as shown on the plans, in accordance with the specifications, and as directed by the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

Aggregate for Overlook shall conform to the materials requirements described in Section 02731 AGGREGATE SURFACE COURSE.

Aggregate Base Course for Overlook shall conform to the materials requirements described in Section 02233 DENSE-GRADE AGGREGATE BASE COURSE.

Separation Geotextile shall conform to the materials requirements described in Section 02378A GEOTEXTILES USED AS FILTERS.

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE

Prior to placement of the Overlook materials, the subgrade shall be prepared by grading to the proper line and grade as shown on the plans, and compacting the subgrade to 95 percent of the laboratory density of the subgrade soils. All depressions developed during compaction shall be filled with suitable material. Any unstable material shall be removed from the subgrade, replaced with suitable material from the Project Site, and the subgrade recompacted to meet the specified density.

All debris, foreign material, and any other undesirable material shall be removed from the subgrade prior to fine grading and compacting. After fine grading and compacting, the subgrade shall be protected from construction traffic, prior to the placement of Overlook materials. Should the subgrade become rutted or otherwise displaced, the fine grade shall be reestablished and recompacted prior to placing the Temporary Overlookmaterials.

3.2 INSTALLATION OF AGGREGATE BASE COURSE

Separation Geotextile shall be installed along the footprint of the Overlook as shown the plans. Aggregate Base Course for Overlook shall then be placed on top of the fabric, and spread and compacted as described below.

3.2.1 SPREADING

Spreading of the aggregate base course may be accomplished with a self-propelled stone spreader box or front-end loader and small bulldozer.

Care shall be taken to assure that the thickness shown on the plans, after compaction, is achieved. Placement of aggregate base course shall be made in maximum lifts of 4 inches. The aggregate base course shall be

placed without segregation of large and fine particles to assure a well-graded base course.

3.2.2 COMPACTION

Each lift of aggregate base course shall have its moisture content adjusted, as necessary, by the direct application of water to the surface. The aggregate base course shall be thoroughly compacted by a smooth drum compactor with a static weight of 12 tons. Should the material become set to an extent that the pavement becomes unstable and waves under the compactor, the compactor shall removed from the aggregate base course and the unstable area allowed to dry out before compaction is resumed. Re-compaction of unacceptable areas may be necessary.

3.3 INSTALLATION OF SURFACE COURSE

Subsequent to the approval by the Contracting Officer of the Temproary Overlook base course, Aggregate for Overlook shall be placed on top of the base course, and spread and compacted as described below.

3.3.1 SPREADING

Spreading of Aggregate for Overlook will be accomplished with a self-propelled stone spreader box. Care shall be taken to assure that the thickness shown on the plans, after compaction, is achieved. Placement of aggregate surface course shall be accomplished without segregation of large and fine particles to assure a well-graded surface absent pockets of fine material. Additional aggregate surface course shall be added where necessary to produce a smooth surface absent of depressions.

3.3.2 COMPACTION

Immediately after placement of the Aggregate for Overlook, the moisture content of the aggregate shall be adjusted by the direct application of water to the surface. The aggregate surface course shall be thoroughly compacted by a smooth drum compactor with a static weight of 10 tons. Compaction will immediately follow the application of water. Should the material become set to an extent that the pavement becomes unstable and waves under the compactor, the compactor shall removed from the aggregate surface course and the unstable area allowed to dry out before compaction is resumed. Re-compaction of unacceptable areas may be necessary.

-- End of Section --

SECTION 02748A

BITUMINOUS TACK AND PRIME COATS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 81	(1992; R 2000) Cut-Back Asphalt (Rapid-Curing Type)
AASHTO M 82	(1975; R 2000) Cut-Back Asphalt (Medium-Curing Type)

AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

ASTM D 977	(2003) Emulsified Asphalt
ASTM D 2027	(1997) Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	(1997) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	(2002) Cationic Emulsified Asphalt
ASTM D 2995	(1999) Determining Application Rate of Bituminous Distributors

1.3 SUBMITTALS

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

SD-06 Test Reports

Tests

Copies of all test results for bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating compliance with applicable specified requirements, not less than 15 days before the material is required in the work.

SD-13 Records

Waybills and Delivery Tickets; G, RO

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 50 gallons: Waybills and delivery tickets, during progress of the work.

1.4 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.4.1 General

Plant, equipment, machines and tools used in the work will be subject to approval of the Contracting Officer and shall be maintained in a satisfactory working condition at all times.

1.4.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily-determined and controlled rates with an allowable variation, from the specified rate, of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand-hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.4.3 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.5 WEATHER LIMITATIONS

Bituminous coat shall be applied only when the surface to receive the bituminous coat is dry. Bituminous coat shall be applied only when the atmospheric temperature in the shade is 50 degrees F or above, and when the temperature has not been below 35 degrees F for the 12 hours prior to application.

PART 2 PRODUCTS

2.1 TACK COAT

One of the following products shall be used:

Cutback Asphalt (October 15 to April 15):
RC-70 complying with AASHTO M 81, ASTM D 2028.

Emulsified Asphalt (All year):
RS-1, SS-1, SS-1h complying with ASTM D 977.
CSS-1, CSS-1h complying with ASTM D 2397.

2.2 PRIME COAT

One of the following products shall be used:

MC-30 or MC-70 complying with AASHTO M 82, ASTM D 2027.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities, within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Bituminous material for the tack coat shall be applied in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of the surface of the dense-graded aggregate base course upon which it is applied.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. The temperature-viscosity relationship shall be furnished to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

MC-30	85-190 degrees F
MC-70	120-225 degrees F
RC-70	120-200 degrees F*
Emulsions	
RS-1	70-140 degrees F
SS-1	70-160 degrees F
SS-1h	70-160 degrees F
CSS-1	70-160 degrees F
CSS-1h	70-160 degrees F

*These temperature ranges exceed the flash point of the material and care should be taken during heating.

3.4 APPLICATION

Following preparation and subsequent inspection of the surface, the bituminous coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames, other than those from the heaters that are a part of the equipment shall be permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. To obtain uniform application of the bituminous coat on the surface treated at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application to start and stop the bituminous coat on the paper. Immediately after application, the building paper shall be removed and destroyed.

3.5 CURING PERIOD

Following application of the bituminous material, and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure to permit evaporation of any volatiles or moisture. Prime coat shall be allowed to cure, without being disturbed, for a period of at least 48 hours or longer, as may be necessary, to attain penetration into the treated course.

-- End of Section --

SECTION 02763A

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 247	(2002) Glass Beads Used in Traffic Paint

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 792	(2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D 4280	(2003) Extended Life Type, Nonplowable, Prismatic, Raised, Retroreflective Pavement Markers
ASTM D 4505	(2001a) Preformed Plastic Pavement Marking Tape for Extended Service Life
ASTM E 28	(1999) Softening Point of Resins by Ring and Ball Apparatus

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325	(Rev C) Beads (Glass Spheres) Retro-Reflective (Metric)
FS TT-P-1952	(Rev D) Paint, Traffic and Airfield Marking, Waterborne (Metric)

1.2 SUBMITTALS

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

SD-03 Product Data

Equipment; G, RO

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this

section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation.

Composition Requirements; G, RO

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications; G, RO

Document certifying that personnel are qualified for equipment operation and handling of chemicals.

SD-06 Test Reports

Sampling and Testing

Certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory.

SD-07 Certificates

Volatile Organic Compound (VOC)

Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

1.3 DELIVERY AND STORAGE

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.4 EQUIPMENT

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition.

1.4.1 Paint Application Equipment

The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall have a speed during application not less than 5 mph, and shall be capable of applying the stripe widths indicated, at the paint coverage rate specified in paragraph APPLICATION, and of even uniform thickness with clear-cut edges. The paint applicator shall have paint reservoirs or tanks of sufficient capacity and suitable gauges to apply paint in accordance with requirements specified. Tanks shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gauges in full view and reach of

the operator. Paint strainers shall be installed in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

1.4.2 Thermoplastic Application Equipment

1.4.2.1 Thermoplastic Material

Thermoplastic material shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe.

1.4.2.2 Application Equipment

a. Application equipment shall provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the extrusion shoe or spray gun shall prevent accumulation and clogging. All parts of the equipment which come into contact with the material shall be easily accessible and exposable for cleaning and maintenance. All mixing and conveying parts up to and including the extrusion shoes and spray guns shall maintain the material at the required temperature with heat-transfer oil or electrical-element-controlled heat.

b. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skiplines". The equipment shall be capable of applying varying widths of traffic markings.

c. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.

1.4.2.3 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of two general types: mobile applicator and portable applicator.

a. Mobile Application Equipment: The mobile applicator shall be defined as a truck-mounted, self-contained pavement marking machine that is capable of hot applying thermoplastic by either the extrusion or spray method. The unit shall be equipped to apply the thermoplastic marking material at temperatures exceeding 375 degrees F, at widths varying from 3 to 12 inches and in thicknesses varying from 0.020 to 0.190 inch and shall have an automatic drop-on bead system. The mobile unit shall be capable of operating continuously and of installing a minimum of 20,000 lineal feet of longitudinal markings in an 8-hour day.

(1) The mobile unit shall be equipped with a melting kettle which holds a minimum of 6000 pounds of molten thermoplastic material. The kettle shall be capable of heating the thermoplastic composition to temperatures of 375 to 425 degrees F. A thermostatically controlled heat transfer liquid shall be used. Heating of the composition by direct flame will not be allowed. Oil and material temperature gauges shall be visible at both ends of the kettle. The mobile unit shall be equipped with a spray gun system. The spray system shall consist of a minimum of four spray guns, located two on each side of the truck, and shall be capable of marking simultaneous edgeline and centerline stripes. The spray system shall be surrounded (jacketed) with heating oil to maintain the molten thermoplastic at a temperature of 375 to 425 degrees F; and shall be capable of spraying a stripe of 3 to 12 inches in width, and in thicknesses varying from 0.055 inch to 0.095 inch, and of generally uniform cross section.

(2) The mobile unit shall be equipped with an electronic programmable line pattern control system. The control system shall be capable of applying skip or solid lines in any sequence, through any and all of the extrusion shoes, or the spray guns, and in programmable cycle lengths. In addition, the mobile unit shall be equipped with an automatic counting mechanism capable of recording the number of lineal feet of thermoplastic markings applied to the pavement surface with an accuracy of 0.5 percent.

b. Portable Application Equipment: The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stopbars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. The portable applicator shall be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. The portable applicator shall be equipped with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 375 to 425 degrees F, of extruding a line of 3 to 12 inches in width, and in thicknesses of not less than 0.125 inch nor more than 0.190 inch and of generally uniform cross section.

1.4.3 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION, at all operating speeds of the applicator to which it is attached.

1.4.4 Preformed Tape Application Equipment

Mechanical application equipment shall be used for the placement of preformed marking tape. Mechanical application equipment shall be defined as a mobile pavement marking machine specifically designed for use in applying precoated, pressure-sensitive pavement marking tape of varying widths, up to 12 inches. The applicator shall be equipped with rollers, or other suitable compactive device, to provide initial adhesion of the preformed, pressure-sensitive marking tape with the pavement surface.

Additional hand-operated rollers shall be used as required to properly seat the thermoplastic tape.

1.4.5 Surface Preparation Equipment

1.4.5.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cfm of air at a pressure of not less than 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water.

1.4.5.2 Waterblast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.4.6 Marking Removal Equipment

Equipment shall be mounted on rubber tires and shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Waterblasting equipment shall be capable of producing an adjustable, pressurized stream of water. Sandblasting equipment shall include an air compressor, hoses, and nozzles. The compressor shall be equipped with traps to maintain the air free of oil and water.

1.4.6.1 Shotblasting Equipment

Shotblasting equipment shall be capable of producing an adjustable depth of removal of marking and pavement. Each unit shall be self-cleaning and self-contained, shall be able to confine dust and debris from the operation, and shall be capable of recycling the abrasive for reuse.

1.4.6.2 Chemical Equipment

Chemical equipment shall be capable of application and removal of chemicals from the pavement surface, and shall leave only non-toxic biodegradeable residue.

1.4.7 Traffic Controls

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.5 HAND-OPERATED, PUSH-TYPE MACHINES

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at

coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.6 MAINTENANCE OF TRAFFIC

1.6.1 Roads, Streets, and Parking Areas

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flagpersons, and related equipment for the safe passage of vehicles shall be provided.

1.7 WEATHER LIMITATIONS FOR REMOVAL

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for airfields, roads, and streets shall conform to FS TT-P-1952, color as indicated. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 THERMOPLASTIC COMPOUNDS

The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

2.2.1 Composition Requirements

The binder component shall be formulated as a hydrocarbon resin. The pigment, beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

	Percent by Weight	
Component	White	Yellow
Binder	17 min.	17 min.
Titanium dioxide	10 min.	-

Component	Percent by Weight White	Percent by Weight Yellow
Glass beads,	20 min.	20 min.
Calcium carbonate & inert fillers	49 max.	*
Yellow pigments	-	*

*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of this specification are met.

2.2.2 Physical Properties

2.2.2.1 Color

The color shall be as indicated.

2.2.2.2 Drying Time

When installed at 70 degrees F and in thicknesses between 1/8 and 3/16 inch, the composition shall be completely solid and shall show no damaging effect from traffic after curing 15 minutes.

2.2.2.3 Softening Point

The composition shall have a softening point of not less than 194 degrees F when tested in accordance with ASTM E 28.

2.2.2.4 Specific Gravity

The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D 792.

2.2.3 Asphalt Concrete Primer

The primer for asphalt concrete pavements shall be a thermosetting adhesive with a solids content of pigment reinforced synthetic rubber and synthetic plastic resin dissolved and/or dispersed in a volatile organic compound (VOC). Solids content shall not be less than 10 percent by weight at 70 degrees F and 60 percent relative humidity. A wet film thickness of 0.005 inch plus or minus 0.001 inch, shall dry to a tack-free condition in less than 5 minutes.

2.2.4 Portland Cement Concrete Primer

The primer for Portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition. Epoxy primers recommended by the manufacturer shall be approved by the Contracting Officer prior to use. Requests for approval shall be accompanied with technical data, instructions for use, and a 1 quart sample of the primer material.

2.3 PREFORMED TAPE

The preformed tape shall be an adherent reflectorized strip in accordance with ASTM D 4505 Type I or IV, Class optional.

2.4 RAISED REFLECTIVE MARKERS

Either metallic or nonmetallic markers of the button or prismatic reflector type may be used. Markers shall be of permanent colors, as specified for pavement marking, and shall retain the color and brightness under the action of traffic. Button markers shall have a diameter of not less than 4 inches, and shall be spaced not more than 40 feet apart on solid longitudinal lines. Broken centerline marker spacings shall be in segments indicated with gaps indicated between segments. Markers shall have rounded surfaces presenting a smooth contour to traffic and shall not project more than 3/4 inch above level of pavement. Pavement markers and adhesive epoxy shall conform to ASTM D 4280.

2.5 REFLECTIVE MEDIA

Reflective media for airfields shall conform to FS TT-B-1325, Type I, Gradation A. Reflective media for roads and streets shall conform to FS TT-B-1325, Type I, Gradation A or AASHTO M 247, Type I.

2.6 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers by the Contractor in the presence of a representative of the Contracting Officer. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved. Testing shall be performed in an approved independent laboratory. If materials are approved based on reports furnished by the Contractor, samples will be retained by the Government for possible future testing should the material appear defective during or after application.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces to be marked shall be thoroughly cleaned before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements, a pretreatment with an aqueous solution containing 3 percent phosphoric acid and 2 percent zinc chloride shall be applied to prepared pavement areas prior to painting.

3.1.2 Cleaning Concrete Curing Compounds

On new Portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.

b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.

c. All remaining curing compound is intact; all loose and flaking material is removed.

d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.

e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified . The Contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet per gallon. Glass spheres shall be applied uniformly to the wet paint on road and street pavement at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.

b. Nonreflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet per gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

3.2.2 Thermoplastic Compounds

Thermoplastic pavement markings shall be placed upon dry pavement; surface dry only will not be considered an acceptable condition. At the time of installation, the pavement surface temperature shall be a minimum of 40 degrees F and rising. Thermoplastics, as placed, shall be free from dirt or tint.

3.2.2.1 Longitudinal Markings

All centerline, skipline, edgeline, and other longitudinal type markings shall be applied with a mobile applicator. All special markings, crosswalks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator, using the extrusion method.

3.2.2.2 Primer

After surface preparation has been completed the asphalt and/or concrete pavement surface shall be primed. The primer shall be applied with spray equipment. Primer materials shall be allowed to "set-up" prior to applying the thermoplastic composition. The asphalt concrete primer shall be allowed to dry to a tack-free condition, usually occurring in less than 10 minutes. The Portland cement concrete primer shall be allowed to dry in accordance with the thermoplastic manufacturer's recommendations. To shorten the curing time of the epoxy resins an infrared heating device may be used on the concrete primer.

a. Asphalt Concrete Primer: Primer shall be applied to all asphalt concrete pavements at a wet film thickness of 0.005 inch, plus or minus 0.001 inch (265-400 square feet per gallon).

b. Portland Cement Concrete Primer: Primer shall be applied to all concrete pavements (including concrete bridge decks) at a wet film thickness of between 0.04 to 0.05 inch (320-400 square feet per gallon).

3.2.2.3 Markings

After the primer has "set-up", the thermoplastic shall be applied at temperatures no lower than 375 degrees F nor higher than 425 degrees F at the point of deposition. Immediately after installation of the marking, drop-on glass spheres shall be mechanically applied so that the spheres are held by and imbedded in the surface of the molten material.

a. Extruded Markings: All extruded thermoplastic markings shall be applied at the specified width and at a thickness of not less than 0.125 inch nor more than 0.190 inch.

b. Sprayed Markings: All sprayed thermoplastic markings shall be applied at the specified width and the thicknesses designated in the contract plans. If the plans do not specify a thickness, centerline markings shall be applied at a wet thickness of 0.090 inch, plus or minus

0.005 inch, and edgeline markings at a wet thickness of 0.060 inch, plus or minus 0.005 inch.

c. Reflective Glass Spheres: Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 pound per 20 square feet of compound.

3.2.3 Preformed Tape

The pavement surface temperature shall be a minimum of 60 degrees F and the ambient temperature shall be a minimum of 60 degrees F and rising. The preformed markings shall be placed in accordance with the manufacturer's written instructions.

3.2.4 Raised Reflective Markers

Prefabricated markers shall be aligned carefully at the required spacing and permanently fixed in place by means of epoxy resin adhesives. To insure good bond, pavement in areas where markers will be set shall be thoroughly cleaned by sandblasting and use of compressed air prior to applying adhesive.

3.2.5 Reflective Media

Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass spheres shall be accomplished to insure that reflective media is evenly distributed at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, operations shall be discontinued immediately until deficiency is corrected.

3.3 MARKING REMOVAL

Pavement marking, including plastic tape, shall be removed in the areas shown on the drawings. Removal of marking shall be as complete as possible without damage to the surface. Aggregate shall not be exposed by the removal process. After the markings are removed, the cleaned pavement surfaces shall exhibit adequate texture for remarking as specified in paragraph SURFACE PREPARATION. Contractor shall demonstrate removal of pavement marking in an area designated by the Contracting Officer. The demonstration area will become the standard for the remainder of the work.

3.3.1 Equipment Operation

Equipment shall be controlled and operated to remove markings from the pavement surface, prevent dilution or removal of binder from underlying pavement, and prevent emission of blue smoke from asphalt or tar surfaces.

3.3.2 Cleanup and Waste Disposal

The worksite shall be kept clean of debris and waste from the removal operations. Cleanup shall immediately follow removal operations in areas subject to air traffic. Debris shall be disposed of at approved sites.

-- End of Section --

SECTION 02770A

CONCRETE SIDEWALKS AND CURBS AND GUTTERS

PART 1 GENERAL

This work includes furnishing, delivering, handling, installing, and placing (as applicable) all material, labor, equipment, tools, and incidentals necessary to complete the work specified herein. Concrete sidewalks shall be constructed at locations indicated on the drawings.

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 2000) Burlap Cloth Made from Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185	(2002) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 615/A 615M	(2003a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 616/A 616M	(1996a) Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 617/A 617M	(1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 31/C 31M	(2003a) Making and Curing Concrete Test Specimens in the Field
ASTM C 143	(2003) Slump of Hydraulic Cement Concrete
ASTM C 171	(2003) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173	(1996) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 3405	(1996) Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements

1.2 SUBMITTALS

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

SD-03 Product Data

Concrete;

Copies of certified delivery tickets for all concrete used in the construction.

SD-06 Test Reports

Field Quality Control; G, RO

Copies of all test reports within 24 hours of completion of the test.

1.3 WEATHER LIMITATIONS

1.3.1 Placing During Cold Weather

Concrete placement shall not take place when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Provisions shall be made to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water and aggregates shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.3.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

1.4 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.4.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.4.2 Slip Form Equipment

Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in 1 pass.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall conform to the applicable requirements of Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE except as otherwise specified. Concrete shall have a minimum compressive strength of 3500 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches.

2.1.1 Air Content

Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C 143.

2.1.3 Reinforcement Steel

Reinforcement bars shall conform to ASTM A 615/A 615M. Wire mesh reinforcement shall conform to ASTM A 185.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C 309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Contraction Joint Filler for Curb and Gutter

Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.

2.4.2 Expansion Joint Filler, Premolded

Expansion joint filler, premolded, shall conform to ASTM D 1751 or ASTM D 1752, 3/8 inch thick, unless otherwise indicated.

2.5 JOINT SEALANTS

2.5.1 Joint Sealant, Cold-Applied

Joint sealant, cold-applied shall conform to ASTM C 920.

2.5.2 Joint Sealant, Hot-Poured

Joint sealant, hot-poured shall conform to ASTM D 3405.

2.6 FORM WORK

Form work shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Section 02300A EARTHWORK.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with

water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope of 1/4 inch per foot with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Concrete shall be placed in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.2 Curb and Gutter Finishing

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete

placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler shall be placed with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURING AND PROTECTION

3.6.1 General Requirements

Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.6.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches.The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.6.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.6.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet per gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.6.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.6.3 Protection

Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.6.4 Protective Coating

Protective coating of linseed oil mixture shall be applied to the exposed-to-view concrete surface.

3.6.4.1 Application

Curing and backfilling operation shall be completed prior to applying two coats of protective coating. Concrete shall be surface dry and clean before each application. Coverage shall be by spray application at not more than 50 square yards per gallon for first application and not more than 70 square yards per gallon for second application, except that the number of applications and coverage for each application for commercially prepared mixture shall be in accordance with the manufacturer's instructions. Coated surfaces shall be protected from vehicular and pedestrian traffic until dry.

3.6.4.2 Precautions

Protective coating shall not be heated by direct application of flame or electrical heaters and shall be protected from exposure to open flame, sparks, and fire adjacent to open containers or applicators. Material shall not be applied at ambient or material temperatures lower than 50 degrees F.

3.7 FIELD QUALITY CONTROL

3.7.1 General Requirements

The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.7.2 Concrete Testing

3.7.2.1 Strength Testing

The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31/C 31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.7.2.2 Air Content

Air content shall be determined in accordance with ASTM C 173 or ASTM C 231. ASTM C 231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two tests for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. If results are out of tolerance, the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each

truckload of material until such time as the air content is within the tolerance specified.

3.7.2.3 Slump Test

Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.7.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

3.7.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.8 SURFACE DEFICIENCIES AND CORRECTIONS

3.8.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.8.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.8.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

-- End of Section --

SECTION 02821

FENCING

Item Number 44: Construction Fence
Item Number 45: Herbivory Fence

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Under this section, the work shall consist of the installation, maintenance, and removal, where applicable, of Construction Fence and Herbivory Fence in accordance with the plans and specifications, and as directed by the Contracting Officer.

1.2 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 648	(2001) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

1.3 SUBMITTALS

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

SD-03 Product Data

Construction Fence; G, RO

Submit product information 30 days prior to starting work.

Herbivory Fence; G, RO

Submit product information 30 days prior to starting work.

PART 2 PRODUCTS

2.1 CONSTRUCTION FENCE

Construction Fence shall be made of the following materials, as shown on the plans:

Fence Fabric: Fabric shall be made from high-density polyethylene, with a minimum tensile strength of 34.5 megapascals when tested in

accordance with ASTM D 648. The fabric shall have 2 inch x 2.75 inch mesh openings, be bright orange in color, and be ultraviolet stabilized.

Posts: Steel posts, u-shaped with a minimum weight of 1 pound 6 ounces per foot.

Plastic zip ties: 6 inch long plastic zip ties.

2.2 HERBIVORY FENCE

Herbivory Fence shall be made of the following materials, as shown on the plans:

Stakes: Untreated hardwood lumber, pointed-tip stakes. Stakes must be free from large knots that weaken the strength of the stake.

Fence Fabric: Fabric shall be made from high-density polyethylene, with a minimum tensile strength of 34.5 megapascals when tested in accordance with ASTM D 648. The fabric shall have 2 inch x 2.75 inch mesh openings and be ultraviolet stabilized.

Plastic zip ties: 6 inch long plastic zip ties.

U-Nails: 1½ inch hot dipped galvanized u-nails.

Nylon twine: Braided nylon mason's line #18 gauge cord with tensile strength of 150 pounds. Acceptable colors are white or yellow.

Flagging: mylar tape.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Construction Fence Installation

Construction Fence shall be installed prior to the commencement of construction on the Project Site, except for construction of the Anti-tracking Pad. The fence shall be installed at the locations and grades indicated on the plans. After a 50-foot section of posts have been installed, a panel of fence fabric, 50 feet long, shall be securely and permanently fastened to the top, middle, and bottom of the stakes with plastic ties. All fence shall be placed so that the bottom of the fence lies entirely on the ground surface.

3.1.2 Herbivory Fence Installation

Herbivory Fence shall be installed after final grades and placement of the coir log and matting in the low and high marsh planting areas are completed and approved by the Contracting Officer. Herbivory Fence shall be installed prior to or concurrently with installation of the low and high marsh plants. Under no circumstances are these plants to be planted outside the containment of a satisfactorily installed Herbivory Fence.

The planting area shall be divided into cells by single rows of vertical stakes along the cell perimeter as shown on the plans. Stakes shall be pounded vertically into the substrate. Several stakes shall be also be installed in the interior of each cell as depicted on the plans.

After a 50-foot section of stakes have been installed, a panel of fence fabric, 50 feet long, shall be securely and permanently fastened to the top, middle, and bottom of the stakes with plastic ties. All fence shall be placed so that the bottom of the fence lies entirely on the substrate. Where fence fabric cannot reach the bottom elevation, poles will be placed 6 inches apart along the entire opening to allow passage of tidal waters, but not the passage of geese or *Phragmites* wrack.

Upon completion of the outer perimeter of each cell and the installation of interior stakes, nylon twine shall be strung across the tops of the planting areas from the perimeter stakes to the interior stakes in a pattern as shown on the plans. The nylon twine shall be nailed into the top of a stake with a u-nail, then wrapped around the top of the stake several times. The twine shall be strung to the next stake and nailed and wrapped again before continuing on to the next stake. It is critical that there be no gaps greater than 5 feet between strands of nylon twine.

Mylar flagging, trailing at least 12 inches of tape from the tie, shall be tied to the top of each hardwood stake (both perimeter and interior). The flagging shall also be tied along the top of the fence fabric and along the interior nylon twine as shown on the plans.

Stringing of the interior twine and tying of mylar flagging may be done after planting in a cell is completed; however, no planted area is to be left exposed without interior lines and flagging at the end of any workday.

No unused strands of nylon twine, fence fabric, packaging materials, wood stakes or any other construction debris shall be left on the Project Site after fence installation and maintenance has been completed.

3.2 MAINTENANCE

3.2.1 Construction Fence Maintenance

The Contractor shall maintain the Construction Fence during the life of this Contract and shall repair or replace all members that are disturbed, damaged, destroyed or vandalized at no cost to the Government. Upon completion of the work the fence shall be removed and shall become the property of the Contractor.

3.2.2 Herbivory Fence Maintenance

During the 1-year maintenance period of the planted areas, the Herbivory Fence shall be inspected on a monthly basis to maintain the integrity of the fence. All damaged fence shall be repaired immediately. In particular, the fence fabric shall be maintained such that geese cannot trample the fence or walk into the planting area under the fence.

The Contractor shall maintain the fence until the end of the first full growing season. To minimize disturbance, the Contractor shall remove and dispose of the Herbivory Fence at this time (during the winter months). At the conclusion of the maintenance period, the fence and all associated materials shall be completely removed and disposed of off-site by the Contractor.

Loss or damage to vegetation planted within the Herbivory Fence cells that results from inadequate or unsatisfactory maintenance shall be replaced at the expense of the Contractor.

-- End of Section --

SECTION 02831

CHAIN LINK FENCE

Item Number 32: Chain Link Fence

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein. Chain link fence shall be completed in all areas of the work to replace or extend existing fence as indicated in the Contract Drawings. New chain link fence shall match existing.

1.2 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 121	(1999) Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 153	(2003) Zinc-Coated (Hot Dip) on Iron and Steel Hardware
ASTM A 176	(1999) Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
ASTM A 392	(2003) Zinc-Coated SteelChain-Link Fence Fabric
ASTM A 478	(1997; R 2002) Chromium-Nickel Stainless Weaving and Knitting Wire
ASTM A 491	(2003) Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 585	(1997) Aluminum-Coated Steel Barbed Wire
ASTM A 666	(2000) Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 824	(2001) Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM C 94	(2003a) Ready-Mixed Concrete

ASTM D 4541	(2002) Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM F 626	(1996; R 2003) Fence Fittings
ASTM F 668	(1999a) Poly(Vinyl Chloride)(PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric
ASTM F 883	(1997) Padlocks
ASTM F 900	(2003) Industrial and Commercial Swing Gates
ASTM F 1043	(2000) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
ASTM F 1083	(1996) Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(1994) Industrial and Commercial Horizontal Slide Gates
ASTM G 23	(1996) Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM G 26	(1996) Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM G 53	(1996) Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

1.3 SUBMITTALS

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

SD-07 Certificates

Chain Link Fence; G, RO

Statement signed by an official authorized to certify on behalf of the manufacturer attesting that the chain link fence and component materials meet the specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the following:

2.1.1 Chain Link Fence Fabric

ASTM A 392, Class 2, zinc-coated steel wire with minimum coating weight of 2.0 ounces of zinc per square foot of coated surface. Fabric shall be fabricated of 9 gauge wire woven in 2 inch mesh. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.1.2 Gates

ASTM F 900 and/or ASTM F 1184. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Gate frames shall conform to strength and coating requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A or Type B, nominal pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain-link fabric. Each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces. Intermediate braces shall be provided on all gate frames with an electro-mechanical lock. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position.

2.1.3 Posts

ASTM F 1083, zinc-coated. Group IA, with external coating Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B and Group II, formed steel sections, shall meet the strength and coating requirements of ASTM F 1043. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Gate post shall match existing, subject to the limitation specified in ASTM F 900 and/or ASTM F 1184.

2.1.4 Braces and Rails

ASTM F 1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F 1043. Group II, formed steel sections, size 1.66 inch, conforming to ASTM F 1043, may be used as braces and rails if Group II line posts are furnished.

2.1.5 Tension Wire

Tension wire shall be Type I or Type II, Class 2 coating, in accordance with ASTM A 824.

2.1.6 Accessories

ASTM F 626. Ferrous accessories shall be zinc or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be

provided with turnbuckles or other equivalent provisions for adjustment. Barbed wire shall be 2 strand, 12-1/2 gauge wire, zinc-coated, Class 3 in accordance with ASTM A 121 or aluminum coated Type I in accordance with ASTM A 585. Barbed wire shall be four-point barbed type steel wire. Barbed wire support arms shall be the V arm type and of the design required for the post furnished. Tie wire for attaching fabric to rails, braces, and posts shall be 9 gauge steel wire and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A 153 unless modified herein.

2.1.7 Barbed Tape

Reinforced barbed tape, double coil, for fence toppings shall be fabricated from 430 series stainless steel with a hardness range of Rockwell (30N) 37-45 conforming to the requirements of ASTM A 176. The stainless steel strip shall be 0.025 inch thick by 1.0 inch wide before fabrication. Each barb shall be a minimum of 1.2 inch in length, in groups of 4, spaced on 4.0 inch centers. The stainless steel core wire shall have a 0.098 inch diameter with a minimum tensile strength of 140 psiand be in accordance with ASTM A 478. Reinforced barbed tape, single coil, for ground application shall meet the above requirements. Sixteen gauge stainless steel twistable wire ties shall be used for attaching the barbed tape to the barbed wire and to the fence for ground application.

2.1.8 Concrete

ASTM C 94, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 3000 psi at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.1.9 Padlocks

ASTM F 883, Type PO1, Grade 2, Size 1-3/4 inch. Padlocks shall be keyed alike and each lock shall be furnished with two keys.

PART 3 EXECUTION

3.1 GENERAL

Fence shall be installed to match or extend existing lines and grades. Line posts shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 500 feet. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a 2-inch clearance between the bottom of the fabric and finish grade.

3.3 POSTS

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete 36 inches below new grade.

Where solid rock or concrete is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock or concrete. Where solid rock or concrete is covered with an overburden of soil or loose rock, posts shall be set 36 inches below new grade unless a penetration of 18 inches in solid rock or concrete is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock or concrete shall be grouted. Portions of posts not set in rock or concrete shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes 2 inches greater than the post diameter. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Group II line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Driven posts shall be set to a minimum depth of 3 feet and shall be protected with drive caps when being set.

Fence post rigidity shall be tested by applying a 50 pound force on the post, perpendicular to the fabric, at 5 feet above ground. Post movement measured at the point where the force is applied shall be less than or equal to 3/4 inch from the relaxed position. Every tenth post shall be tested for rigidity. When a post fails this test, further tests on the next four posts on either side of the failed post shall be made. All failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.4 RAILS

3.4.1 Top Rail

Top rail shall be supported at each post to form a continuous brace between terminal posts. Where required, sections of top rail shall be joined using sleeves or couplings that will allow expansion or contraction of the rail. Bottom rail, if required for high security fence, shall be installed as directed.

3.4.2 Bottom Rail

The bottom rail shall be bolted to double rail ends and double rail ends shall be securely fastened to the posts. Bolts shall be peened to prevent easy removal. Bottom rail shall be installed before chain link fabric.

3.5 BRACES AND TRUSS RODS

Braces and truss rods shall be installed in conformance with the standard practice for the fence furnished. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed on fences over 6 feet in height. A center brace or 2 diagonal truss rods shall be installed on 12 foot fences. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences 6 feet high or less if a top rail is installed.

3.6 TENSION WIRES

Tension wires shall be installed along the top and bottom of the fence line and attached to the terminal posts of each stretch of the fence. Top tension wires shall be installed within the top 4 inches of the installed

fabric. Bottom tension wire shall be installed within the bottom 6 inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.7 CHAIN LINK FABRIC

Chain link fabric shall be installed on the side of the post to match existing. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15 inch intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 12 inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 2 inches (plus or minus 1/2 inch) above the ground. After the fabric installation is complete, the fabric shall be exercised by applying a 50 pound push-pull force at the center of the fabric between posts. The use of a 30 pound pull at the center of the panel shall cause fabric deflection of not more than 2.5 incheswhen pulling fabric from the post side of the fence. Every second fence panel shall meet this requirement. All failed panels shall be resecured and retested at the Contractor's expense.

3.8 BARBED WIRE SUPPORTING ARMS AND BARBED WIRE

Barbed wire supporting arms and barbed wire shall be installed as recommended by the manufacturer. Supporting arms shall be anchored with 3/8 inch diameter plain pin rivets or, at the Contractor's option, with studs driven by low-velocity explosive-actuated tools for steel, wrought iron, ductile iron, or malleable iron. Studs driven by an explosive-actuated tool shall not be used with gray iron or other material that can be fractured. A minimum of two studs per support arm shall be used. Barbed wire shall be pulled taut and attached to the arms with clips or other means that will prevent easy removal.

3.9 GATES

Hinged gates shall be mounted to swing to match existing. Latches, stops, and keepers shall be installed as required. Padlocks shall be attached to gates or gate posts with chains. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

3.10 BARBED TAPE

Barbed tape shall be stretched out to its manufacturer's recommended length, set on top of the barbed wire and "V" shaped support arms, and then secured to the barbed wire. The barbed tape shall be secured to the barbed wire at the two points and at every spiral turn of both coils as shown on the drawings. Stainless steel reinforced barbed tape for ground applications shall be installed per manufacturer's recommendations.

3.11 GROUNDING

Fences shall be grounded on each side of all gates, at each corner, at the closest approach to each building located within 50 feet of the fence, and where the fence alignment changes more than 15 degrees. Grounding locations shall not exceed 650 feet. Each gate panel shall be bonded with

a flexible bond strap to its gate post. Fences crossed by powerlines of 600 volts or more shall be grounded at or near the point of crossing and at distances not exceeding 150 feet on each side of crossing. Ground conductor shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall be 3/4 inch by 10 foot long copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least 6 inches below the grade. Where driving is impracticable, electrodes shall be buried a minimum of 12 inches deep and radially from the fence. The top of the electrode shall be not less than 2 feet or more than 8 feet from the fence. Ground conductor shall be clamped to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. After installation the total resistance of fence to ground shall not be greater than 25 ohms.

-- End of Section --

SECTION 02870

SITE FURNISHINGS

Item Number 46: Pipe Rail Fence

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work under this section shall include furnishing and installing Pipe Rail Fence, in accordance with the plans, specifications, and directions of the Contracting Officer. Work shall also include the restoration of any areas damaged during the work, clean-up of work areas, and disposal of any excess materials to the satisfaction of the Contracting Officer.

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 53	(2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	(1997; Rev. A) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM F 668	(1999a) Poly(Vinyl Chloride) (PVC)-Coated Steel Chain-Link Fence Fabric
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM F 1083	(1997; R 2003) Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM D 3359	(1997) Measuring Adhesion by Tape Test

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2002) Structural Welding Code - Steel

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the

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

SD-02 Shop Drawings

Pipe Rail Fence Drawings; G, RO.

Submit drawings showing scaled details, including elevations; dimensions; details; post-spacing layout; mounting methods; shape and thickness of materials; and details of construction and/or installation, including concrete footings. Drawings shall be submitted 30 days prior to start of construction.

SD-03 Product Data

Pipe Rail Fence; G, RO.

Submit product information 30 days prior to starting work.

SD-04 Samples

Pipe Rail Fence; G, RO

Submit a 12-inch section of galvanized, powdercoated fence for testing and approval.

SD-06 Test Reports

Pipe Rail Fence Test

Submit a report of post-installation test results within 3 days of installation.

PVC Powdercoating Test; G, RO
TGIC-Polyester Powdercoating Test; G, RO

Submit a report of field/lab test results within 3 days of testing.

SD-07 Certificates

Testing Laboratory Qualifications

Submit qualifications of the commercial testing laboratory when lab test reports are submitted.

Pipe Rail Fence; G, RO

Submit a certificate that pipe rail material complies with the materials requirements of this section. Submit a foundry certificate verifying authenticity of any ductile iron used for the fence. The certificate shall be on foundry letterhead, dated and signed by the Foundry President with the Contract No., Contract name, specific part(s) purchased, Contractor name, and class of ductile iron provided.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

2.1.1 Pipe Rail Fence

All material as delivered shall be in coniditon for erection without field fitting or cutting. Other pipe rail fence materials shall consist of the following:

a. Posts and rails shall be galvanized steel pipe in accordance with ASTM F 1083 and ASTM A 53 Schedule 40.
b. Dowels shall be stainless steel 18-8.
d. Castings shall be fabricated from ductile iron grade 65-45-12.
d. Finials shall be cast ductile iron conforming to ASTM A 536.

2.1.2 Surface Coating

Surface coatings shall be either polyvinyl chloride (PVC) or TGIC-Polyester. The color of the surface coating shall be black.

2.1.3 Concrete Footing

Materials for concrete footings shall conform to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

PART 3 EXECUTION

3.1 DELIVERY, INSPECTION, STORAGE, AND PROTECTION

Materials shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. Items shall be shipped knocked-down ready for site assembly. Packaged components shall be complete, including all accessories and hardware. New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. Materials shall be inspected upon arrival at the job site for conformity to specifications and quality in accordance with paragraph MATERIALS. The Contractor shall protect materials from corrosion, staining, and other types of damage, store items in designated areas free from contact with soil and weather, and remove and replace any damaged items with new items.

3.2 INSTALLATION

3.2.1 Welding

Welding shall be done by competent mechanics in accordance with AWS D1.1/D1.1M. All welds shall be ground smooth. All welds shall be spot primed immediately after welding in the shop with a protective zinc-rich metal primer.

3.2.2 Surface Coatings

The entire fence system, including all components, shall be coated on all surfaces with a surface coating.

Galvanizing of all components shall provide an acceptable substrate for applied surface coatings. No lacquer, urethane or other coatings that would prevent propoer adhesion of the surface coating shall be applied to the pipe.

The surface coating shall be applied to the galvanized surfaces in such a manner that the coating will not peel off. Surfaces to be coated shall be clean and dry and free of grease, dust, rust, etc. All coated parts shall first receive phosphating and chromatizing treatments to improve the adhesion of the surface coating.

3.2.2.1 PVC Powdercoating

PVC powdercoating shall be applied to the galvanized steel or iron by the fluid bed method to a preheated base that has been cleaned and primed prior to submersion in vinyl, resulting in a firm bond between the PVC and the metail. PVC shall be applied to a film thickness of 10 to 15 mils without voids, tears or cuts that reveal the substrate and shall thoroughly adhere to the metal without peeling when scratched with a pick device or knife blade point.

3.2.2.2 TGIC-Polyester Powdercoating

TGIC-Polyester powdercoating shall be applied to the galvanizing steel or iron in such a manner that the coating will not peel off. The TGIC-Polyester shall be applied at a film thickness of 3 to 6 mils by electrostatic spray process and bake-finished per manufacturer's directions. The TGIC-Polyester shall be applied without voids, tears or cuts that reveal the substrate and shall thoroughly adhere to the metal without peeling when scratched with a pick device or knife blade point.

3.2.3 Pipe Rail Fence

When the inspection of parts has been completed by the Contracting Officer, the Contractor shall assemble the pipe rail fence according to the manufacturer's instructions, and in accordance with the plans and specifications. When the fence is assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

The Contractor shall verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of pipe rail fence. Fence shall be installed plumb and true, at locations indicated, and in accordance with the approved manufacturer's instructions and shop drawings.

The Contractor shall excavate and compact for each post as shown on the plans. Excavation, compaction, and backfilling shall be in accordance with the applicable requirements of Section 02300A EARTHWORK. Excavation and compaction shall be approved by the Contracting Officer prior to pouring concrete. Posts shall be set in the concrete as shown on the plans, true to line and grade. After the posts have been set in place and properly supported to hold them to line and grade, the remaining space shall be neatly filled with a grout consisting of 1 part cement and 2 parts sand.

3.3 WELDING

Welders shall be qualified in accordance with AWS D1.1/D1.1M and use procedures, materials, and equipment of the type required for work under

this Contract. All welding, welding inspection, and corrective welding shall be performed in accordance with AWS D1.1/D1.1M. Continuous welds shall be used on all exposed connections. Visible welds shall be ground smooth.

3.4 TESTING

3.4.1 Pipe Rail Fence

Pipe rail fence shall be tested to determine a secure and correct installation. The Contractor shall determine that the installation is correct by measuring the physical dimensions and clearance of the fence for compliance with manufacturer's recommendations and/or as shown on the plans. Fence that does not comply shall be reinstalled. A written report describing the testing resultsshall be submitted.

3.4.2 PVC Powdercoating Field Test

In accordance with ASTM F 668, 3 samples of the PVC powdercoated fence shall be tested for bonding of the powdercoat to the metal. Each test will consist of making two cuts parallel to the axis of the pipe or casting through the coating, approximately 1/16 inch apart, at least 1/2-inch long. With a knife, a section of the coating shall be peeled back between 1/8-inch and 1/4-inch long to produce a tab. An attempt shall be made to remove the 1/16-inch long strip of coating by pulling the tab. The coating shall be deemed acceptable if it breaks rather than separates from the metal on all three samples.

3.4.3 TGIC-Polyester Powdercoating Laboratory Test

A sample of the TGIC-Polyester powdercoated fence shll be laboratory tested for bonding of the coating to the metal. The test shall be the cross hatch test pe ASTM D 3359, Method B. Failure to satisfactorily pass this test shall be a basis for rejection.

The Contractor shall submit a certificate of the Testing Laboratory Qualifications.

3.5 TOUCH-UP AND REPAIR

For minor damage caused by installation or transportation and field-welded metal powder coated surfaces, clean welds, bolted connections, and abraded areas, the Contractor shall touch-up and repair as follows:

a. On damaged galvanized surfaces, organic zinc repair paint complying with ASTM A 780 shall be applied. Galvanizing repair paint shall have 65 percent zinc by weight. Thickness of repair paint shall not be less than that required by ASTM A 123. Repairs shall be done to the satisfaction of the Contracting Officer.

b. On damaged powdercoated surfaces, the finish shall be touched-up in conformance with the manufacturer's recommendations. Touch-ups shall be done in a way such that repair is not visible from a distance of 6 feet to the satisfaction of the Contracting Officer.

3.6 RESTORATION AND CLEAN UP

When installation has been completed, the Contractor shall restore any

areas damaged during installation operations to their original conditions.

Installation work areas shall also be cleaned up, including the removal of any excess materials. The Contractor shall remove damaged, excess, and waste materials from the Project Site and dispose of the materials off the Project Site.

Pipe rail fence surfaces shall be cleaned of dirt, stains, filings, excess materials, and other blemishes occurring from shipment and installation to the satisfaction of the Contracting Officer. Cleaning methods and agents shall be according to manufacturer's instructions or as indicated.

-- End of Section --

SECTION 02921A

SEEDING

Item Number 47: Lawn Seed Mix
Item Number 48: Native Grass Seed Mix
Item Number 49: Upland Topsoil
Item Number 50: Surface Erosion Control Blanket

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, and installing (as applicable) all material, labor, equipment, tools, and incidentals necessary to complete the work specified herein. Seeding establishment shall be completed in all areas of the work as indicated on the plans and specifications, and at the direction of the Contracting Officer.

The Contractor shall make necessary arrangements to ensure an adequate supply of freshwater to meet the needs of this Contract. The Contractor shall furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of all seeding areas as required to complete the work specified under this section. No extra payment will be made from water coming from the Contractor's own source.

1.2 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a; R 2001) Agricultural Liming Materials
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1777	(1996) Measuring Thickness of Textile Materials
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4972	(2001) pH of Soils
ASTM D 5035	(1995) Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5261	(1992; R 1996) Measuring Mass per Unit Area of Geotextiles

ASTM D 5268 (2002) Topsoil Used for Landscaping Purposes

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act (1940; R 1988; R 1998) Federal Seed Act

1.3 SUBMITTALS

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

SD-03 Product Data

Delivery Schedule; G, RO

Submit a delivery schedule at least 10 days prior to the intended date of the first delivery.

Seed; G, RO
Delivered Upland Topsoil; G, RO
pH Adjusters; G, RO
Fertilizer; G, RO
Organic Material; G, RO
Soil Conditioner; G, RO
Mulch; G, RO
Surface Erosion Control Blanket; G, RO

Submit product information for delivered materials 30 days prior to starting work. Data sheets shall show that materials meet the requirements specified herein. Data sheets 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, for each of the seed mixes.

b. Upland Topsoil: Particle size and textural class.

c. pH adjusters. 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.

h. Surface Erosion Control Blanket: Composition and source.

Equipment; G, RO

Submit a listing of equipment to be used for the seeding operations 3 days prior to starting work.

Finished Grade and Upland Topsoil; G, RO

At least 24 hours prior to the commencement of seeding operations, the Contractor shall submit verification that finished grades are as indicated on the plans, and that the requirements for the placing of Upland Topsoil, smooth grading, and compaction in the seeding areas have been met. The Contracting Officer shall approve this submittal prior to commencement of seeding operations.

Quantity Check;

Submit bag count and/or bulk weight measurements of material used compared with area covered to verify the application rate and quantity installed.

SD-04 Samples

Delivered Upland Topsoil; G, RO

Submit samples taken from several locations at the source at least 15 calendar days prior to scheduled soil amendment delivery.

Soil Amendments; G, RO

Submit 10 pound samples of any soil amendments to be used at least 15 calendar days prior to scheduled soil amendment delivery.

Mulch; G, RO

Submit a 10 pound sample at least 15 calendar days prior to scheduled mulch delivery.

Surface Erosion Control Blanket; G, RO

Submit a sample at least 15 calendar days prior to scheduled delivery.

SD-06 Test Reports

Equipment Calibration; G, RO

Within 1 week of testing, submit a certification of calibration tests conducted on the equipment used during the seeding operations.

Germination and Purity Test for Seed; G, RO

Submit germination and purity test for the seed mixes 3 months prior to the start of seeding operations.

Soils Test; G, RO

Submit certified reports of laboratory tests, prepared by an independent soil testing laboratory, including analysis and interpretation of test results. The species to be seeded and planted shall be designated. Each report shall be properly

identified. Test methods used and compliance with recognized test standards shall be described.

Soil Amendments Testing; G, RO

For bulk deliveries, submit a chemical analysis test at least 10 calendar days prior to scheduled soil amendment delivery.

SD-07 Certificates

One-year Plant Guarantee - Seeding; G, RO

Submit a signed one-year plant guarantee at least 30 calendar days prior to commencement of seeding operations.

Testing Laboratory Qualifications; G, RO

Submit qualifications of the commercial testing laboratory or Contractor's testing facilities when test reports are submitted.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A Delivery Schedule shall be submitted to the Contracting Officer specifying the dates and approximate times of all deliveries of seeding materials.

1.4.1.1 Seed

Seed shall be delivered to the Project Site in the original, unopened bags showing the net weight, composition of mix, suppliers name, and guarantee of analysis. Damaged or faulty packages shall not be used and will be rejected. Labels shall be in conformance with AMS Seed Act and applicable state seed laws.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's name, chemical analysis, and weight of the bag. In lieu of containers, soil amendments may be furnished in bulk.

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; Upland Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1 1/2 inch diameter; and Upland Topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the Project Site by the Contractor.

1.4.3 Storage

Materials shall be stored in designated areas or as directed by the Contracting Officer. Seed, lime, and fertilizer shall be stored in cool,

dry locations away from contaminants.The Contracting Officer may designate where the superphosphate shall be stored. Seed shall be stored in original unopened packages and not opened until needed for use.

1.4.4 Handling

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

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

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

2.1.2 Permanent Seed Species and Mixtures

2.1.2.1 Lawn Seed Mix

Lawn Seed Mix shall meet the following requirements:

Common Name (Botanical Name)	Percent Purity	Minimum Germination	Percent Maximum Weed Seed	Percent By Weight
tall fescue (Lolium arundinaceum)	98	85	0.25	60
Kentucky bluegrass (Poa pratensis)	98	80	0.10	20
perennial ryegrass (Lolium perenne)	98	85	0.25	20

Application Rate for Lawn Seed Mix Rate = 100 lbs. per acre.

2.1.2.2 Native Grass Seed Mix

Native Grass Seed Mix shall be provided on the basis of pure live seed (PLS). Seeding operations shall follow the bulk seed rates and shall be performed such that an equal distribution of PLS across the seeding area is achieved. The Contractor shall be responsible for adjusting the bulk seeding rates based on the test results for percent purity and percent germination to insure that the PLS rate is achieved. Native Grass Seed Mix shall meet the following requirements:

Common Name (Botanical Name)	Percent Purity	Minimum Germination	Application Rate (lbs./acre) PLS	Bulk Seed
Grasses				
little bluestem (Andropogon scoparius)	70	60	2	5
blaze big bluestem (Andropogon gerardii)	70	60	2	5

Common Name (Botanical Name)	Percent Purity	Minimum Germination	Application Rate (lbs./acre) PLS	Application Rate (lbs./acre) Bulk Seed
niagra switchgrass (Panicum virgatum)	95	80	2	3
blackwell side oats grama (Bouteloua curtipendula)	75	60	1	2
trailway annual rye (Lolium multiflorum)	98	90	1	1
Perennial Wildflowers				
butterfly weed (Asclepias tuberosa)	n/a	n/a	0.01	0.125
zig zag aster (Aster prenanthoides)	n/a	n/a	0.01	0.125
New England aster (Aster novae-angliae)	n/a	n/a	0.01	0.125
New York aster (Aster novi-belgii)	n/a	n/a	0.01	0.125
indian paintbrush (Castilleja coccinea)	n/a	n/a	0.1	0.125
oxeye daisy (Chrysanthemum leucanth)	n/a	n/a	0.1	0.125
lance-leaved coreopsis (Coreopsis lanceolata)	n/a	n/a	0.05	0.125
hardy ageratum (Eupatorium coelestinum)	n/a	n/a	0.1	0.125
ox-eyed sunflower (Heliopsis helianthoides)	n/a	n/a	0.1	0.125
perennial lupine (Lupinus perennis)	n/a	n/a	0.05	0.125
showy evening primrose (Oenothera speciosa)	n/a	n/a	0.01	0.125
beardtongue (Penstemon digitalis)	n/a	n/a	0.1	0.125
summer phlox (Phlox paniculata)	n/a	n/a	0.1	0.125
black-eyed susan (Rudbeckia hirta)	n/a	n/a	0.01	0.125
brown-eyed susan (Rudbeckia triloba)	n/a	n/a	0.01	0.125
early goldenrod (Solidago juncea)	n/a	n/a	0.01	0.125
	Total Bulk Native Grass Seed Mix Rate = 18			

The bulk seed rate is calculated by:

lbs. bulk seed/acre = # lbs. PLS/acre / (% germination * % purity).

2.1.3 Temporary Seed Species and Mixtures

Temporary seed species and mixtures shall be proportioned as follows:

Common Name Botanical Name	Percent Pure Live Seed	Bulk Seed Application Rate (lbs/acre)
annual rye grass (Lolium multiflorum)	88	10

2.1.4 Quality

For Native Grass Seed Mix and Temporary Seed Mixes, weed seed shall be a maximum 1 percent by weight of the total mixture. Lawn Seed Mix shall conform to the maximum percent weed seed listed in the above table. Seed shall be free of noxious weeds, undesirable grasses, millet or any other large-seed producing grass. Wet, moldy, or otherwise damaged seed shall be rejected.

2.1.5 Seed Mixing

Seed shall be mixed by the seed supplier prior to delivery to the Project Site.

2.1.6 Substitutions

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

2.2 UPLAND TOPSOIL

Upland Topsoil shall be as defined in ASTM D 5268. Upland Topsoil shall consist of natural, friable soil and is reasonably free from underlying subsoil, clay lumps, objectionable weeds, viable plants and plant parts, slag, cinders, stones, lumps of soil, sticks, roots, brush, trash or other material over a minimum 1 1/2 inch diameter. Upland Topsoil shall be free from toxic substances or any material that might be harmful to plant growth or be a hindrance to grading, seeding, planting or maintenance operations. Upland Topsoil material shall be approved by the Contracting Officer.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, and organic material meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjusters

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, sulfur, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140

percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 35 percent shall pass through a No. 60 sieve.

2.3.2 Fertilizer

2.3.2.1 Native Grass Fertilizer

The nutrients ratio for Native Grass Fertilizer shall be 0 percent nitrogen, 10 percent phosphorus, and20 percent potassium. Nitrogen fertilizer shall not be used. Fertilizer shall be controlled release commercial grade, free flowing, and uniform in composition, conforming to CID A-A-1909. Granular Fertilizer: The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea. Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.2.2 Lawn Fertilizer

The nutrients ratio for Lawn Fertilizer shall be 10 percent nitrogen, 6 percent phosphorus, and 4 percent potassium. Fertilizer shall be a 50 percent slow release, commercial grade. The guaranteed analysis shall have a minimum of 50 percent of the total nitrogen, derived from ureaform, furnishing 3 1/2 percent minimum water insoluble Nitrogen. The balance of nitrogen shall be present as methylene urea, soluble urea nitrate, and ammoniacal compounds.

2.3.2.3 Superphosphate

Superphosphate shall contain 20 percent by weight of available phosphoric acid. The Contracting Officer reserves the right to make tests on the material at any time and acceptance or rejection shall be based upon results of these tests.

2.3.3 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost or worm castings.

2.3.3.1 Bonemeal

Bonemeal shall be finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2.3.3.2 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume of straw, sawdust or other bedding materials. 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.

2.3.3.3 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings or other wood waste materials that are free of stones, sticks, soil, and toxic substances harmful to plants, and are fully composted or stabilized with nitrogen.

2.3.3.4 Recycled Compost

Compost shall be from 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.

The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.3.3.5 Worm Castings

Worm castings shall be screened from worms and food source, and shall be commercially packaged.

2.3.4 Soil Conditioner

Soil conditioner shall be sand or gypsum.

2.3.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.4.2 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

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 Mulch for Permanent Seeding

2.4.1.1 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 shall be between 9 and 15 percent moisture. pH shall range from 4.5 to 6.0.

2.4.1.2 Paper Fiber

Paper fiber mulch shall be recycled newsprint that is shredded for the purpose of mulching seed.

2.4.2 Temporary Mulch

Temporary mulch materials shall be 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.

2.4.2.1 Temporary Mulch Binder

Temporary mulch binder shall be a cellulose or non-asphaltic emulsion, natural gum binder blended with gelling or hardening agents.

2.5 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. If freshwater is not available from local sources, the Contractor is responsible for supplying water from their own source. Water shall be free of oil, acid, alkalis, salts and other substances toxic to plant life.

2.6 SURFACE EROSION CONTROL BLANKET

Surface erosion control blanket material shall conform to the following:

2.6.1 Surface Erosion Control Blanket

Surface Erosion Control Blanket shall consist of 100 percent wheat straw mechanically bound and covered on both sides by netting. The blanket shall be sewn with photodegradable polypropylene thread. Straw blankets shall conform to the following requirements:

Physical Property	Test Method	Typical Roll Values
Thickness	ASTM D 1777	0.11 inches
Tensile Strength	ASTM D 5035	50 pounds/feet x 65 pounds/feet
Elongation	ASTM D 5035	20 percent
Mass per Unit Area	ASTM D 5261	8.5 ounces/square yard

2.6.2 Netting

Netting shall be photodegradable with mesh openings of approximately 1/2 inch x 1/2 inch. Material shall be biodegradable plastic mesh, interwoven biodegradable thread, plastic netting or twisted kraft paper cord netting.

2.6.3 Erosion Control Material Anchors

Erosion control material anchors shall be as recommended by the manufacturerfor the blanket materials to be used.

PART 3 EXECUTION

3.1 SEEDING PERIODS, CONDITIONS, AND EQUIPMENT

3.1.1 Seeding Periods

Seed shall be installed between April 1 and June 1 for spring establishment; and from September 1 to October 15 for fall establishment.

3.1.2 Timing

Soil amendments shall be added and tilling shall be completed prior to seeding. For the upland slope areas, seeding operations shall be completed prior to the commencement of planting operations.

3.1.3 Climate Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution. If drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped as directed by the Contracting Officer. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.1.4 Finished Grade and Upland Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of Upland Topsoil, smooth grading, and compaction requirements, where applicable, in the upland slope areas have been completed in accordance with Section 02300A EARTHWORK, prior to the commencement of seeding operations. After grading is complete, heavy equipment is prohibited from entering seeding areas.

3.1.5 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.

3.2 TESTING

3.2.1 Germination and Purity Test for Seed

Prior to ordering the seed mixes, a germination and purity test shall be submitted so that the Contracting Officer can approve the seed and supplier. Seed shall conform to all applicable state and federal regulations and to test provisions of the Association of Official Seed Analysts. There shall be no exceptions. The Contractor is advised that these tests can run two months or more and should be prepared to have these tests completed in sufficient time for the forthcoming seeding season.

3.2.2 Soils Test

Prior to placement of Upland Topsoil as directed under Section 02300A EARTHWORK, the Contractor shall test no less than than 5 samples of delivered Upland Topsoil in accordance with ASTM D 5268 and ASTM D 4972 to determine the pH, organic matter, soluble salt, and nutrient contents. Copies of the test results and testing laboratory qualifications shall be submitted to the Contracting Officer.

3.3 SITE PREPARATION

3.3.1 Application of Soil Amendments

If the soil testing results show that the delivered Upland Topsoil is not within the optimum ranges as specified by the soil testing laboratory for the species to be seeded as described herein or planted under Section 02930 EXTERIOR PLANTING for the Upland Slope areas, the Contractor shall obtain recommendations from the laboratory for quantities and types of soil amendments required to meet the optimum conditions. Prior to application,

these recommendations shall be subject to approval by the Contracting Officer.

For areas to be seeded with Lawn Seed Mix, regardless of the results of the soil testing, Lawn Fertilizer and Superphosphate shall be applied at the rates specified. Native Grass Fertilizer (and all other soil amendments) shall only be applied if recommended by the soils testing laboratory.

3.3.1.1 Applying pH Adjuster

The pH adjuster shall be applied as recommended by the soil test and approved by the Contracting Officer. The pH adjuster shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage operation.

3.3.1.2 Applying Native Grass Fertilizer

Native Grass Fertilizer shall be applied as recommended by the soil test and approved by the Contracting Officer. Native Grass Fertilizer shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation. If the fertilizer is not incorporated concurrently with seeding, seeding shall be completed within 48 hours of fertilizer application.

3.3.1.3 Applying Lawn Fertilizer

Two applications of Lawn Fertilizer shall be applied by machine, each application at the rate of 20 pounds per 1,000 square feet. The first application shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation. If the Lawn Fertilizer is not incorporated concurrently with seeding, seeding shall be completed within 48 hours of the fertilizer application.

The second application shall be made approximately 6 months after the first application. This treatment shall take place during the next appropriate fertilizing season, the following spring or fall, and shall be subject to the direction of the Contracting Officer. The second application shall be applied to the surface only. Incorporation shall be achieved by thoroughly watering the entire area after application. The Contractor shall provide all labor and materials, including freshwater.

3.3.1.4 Applying Superphosphate

Superphosphate shall be applied by machine at the rate of 20 pounds per 1000 square feet.

3.3.1.5 Applying Soil Conditioner

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

3.3.2 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method approved by the

Contracting Officer. 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 Upland Topsoil requirements.

3.4 INSTALLATION

Prior to commencement of seeding, the Contractor shall examine the seeding areas and conditions and notify the Contracting Officer, in writing, of conditions detrimental to the proper and timely completion of the work. The Contractor shall not proceed with seeding until unsatisfactory conditions have been corrected in an acceptable manner, as approved by the the Contracting Officer. 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 be kept as close as possible to the contours and not up and down slopes.

Subsequent to completion of seeding, the Contractor shall only enter seeded areas when absolutely necessary for the completion of the Project. There shall be no exceptions.

3.4.1 Hydroseeding

Seed, mulch, and fertilizer, if necessary, shall be applied by hydroseeding. The seeding procedure shall be carried out in a manner that ensures even coverage across the seeding area. Seed shall be added to meet the rates specified under subparagraph Permanent Seed Species and Mixtures, and fertilizer, if necessary, shall be added to meet the rates specified by the soils testing laboratory. The seed and fertilzer shall be thoroughly mixed with freshwater to produce a homogeneous slurry. Mulch shall then be mixed into the slurry in accordance with the manufacturer's recommendations. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Slurry shall be uniformly applied under pressure over the entire area in accordance with the manufacturer's instructions and at the direction of the Contracting Officer. Hydroseeded areas shall not be rolled.

3.4.2 Surface Erosion Control Blanket

Subsequent to hydroseeding, surface erosion control blanket shall be installed as shown on the plans in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to seeding materials or without deviation to finished grade.

3.4.3 Watering Seed

If planting in the upland slope areas will commence more than 30 days after completion of seeding operations in these areas, watering of seeding areas shall be started immediately after hydroseeding. Clean, freshwater shall be applied as often as required to maintain a moist seedbed for optimum germination, and to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over existing turf or seeded areas, unless otherwise directed. Watering of other adjacent areas or vegetation shall be prevented. If planting of the upland slopes

will start within 30 days of completion of seeding operations, then seeded areas shall not be watered until after the completion of planting operations.

3.5 TEMPORARY SEEDING AND MULCHING

If temporary seeding or mulching is necessary, the Contractor shall thoroughly till the temporary growth or mulch into the seeding substrate prior to permanent seeding.

If the upland slopes are ready to be seeded or planted outside of the specified seasons, a quick cover is required to prevent surface erosion or if required by Contract delays, a temporary seeding or temporary mulching shall be applied as part of the Project's environmental protection plan described in Section 01410 ENVIRONMENT PROTECTION. Temporary seeding shall be performed if construction is completed between June 2 and August 15. Temporary mulching shall be performed if construction is completed between October 16 and March 15.

The Temporary Seed Mix shall be applied in accordance with the paragraph INSTALLATION, except that it shall be added to meet the rates specified under subparagraph Temporary Seed Species and Mixtures.

3.6 QUANTITY CHECK

For seeding materials provided in bags, the empty bags shall be retained for recording the amount used. For seeding 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.

3.7 PROTECTION OF INSTALLED AREAS

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

3.8 MAINTENANCE DURING CONSTRUCTION

3.8.1 Maintenance

The Contractor shall maintain seeded areas seeded until final acceptance of the Contract, including protecting embankments and ditches from surface erosion; maintaining mulch; protecting installed areas from traffic; watering; and mowing (if applicable).

3.8.1.1 Mowing - Lawn Areas

Areas seeded with the Lawn Seed Mix shall be properly mowed and otherwise maintained at a maximum height of 3 inches, or as directed by the Contracting Officer, until final acceptance of the whole work under this contract. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface. Care shall be taken not to disturb preserved and planted trees during mowing operations.

3.8.1.2 Mowing - Native Grass Areas

If vegetation reaches between 12 inches and 18 inches high in the Native

Grass areas, the Contractor shall mow vegetation to no less than 6 inches high using a rotary mower or weed-eater to prevent the weeds from going to seed. Mowing shall not be done with a standard lawn mower. Care shall be taken not to disturb preserved and planted trees during mowing operations.

3.8.1.3 Repair or Reinstall

Any seeded areas disturbed prior to completion of construction, as determined by the Contracting Officer, shall be repaired or reinstalled in accordance with the paragraph INSTALLATION.

3.9 RESTORATION AND CLEAN UP

3.9.1 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.

3.9.2 Clean Up

The Contractor shall remove damaged, excess, and waste material shall be removed from the Project Site and dispose of the materials off Government property. Adjacent paved areas shall be cleaned.

3.10 ONE-YEAR PLANT GUARANTEE - SEEDING

The Contractor shall submit to the Contracting Officer, a written and signed one-year plant guarantee - seeding, which is conditional of: 1) at least 85 percent of the seeded areas are covered by vegetation and 2) at least 80 percent of the species of established vegetation are the plant species specified herein for the seed mix utilized. Seeded areas or portions thereof for which 85 percent survival/80 percent establishment is not reached shall be reseeded once during the subsequent seeding season, to achieve the 85 percent survival/80 percent establishment described above.

The one-year plant guarantee - seeding period shall commence on the date of the completion of construction, and shall end 365 calendar days later. The Contractor shall provide the commencement and ending dates as part of the Periodic Schedule Updates and Progress Curves submitted under Section 01311 PROJECT SCHEDULE: BAR CHART. Following are the terms and conditions of the one-year plant guarantee - native grass seeding:

a. The substrates of the seeding areas will possess a pH greater than 4.5; the addition of soil amendments is allowable to attain this pH value.
b. Seeding operations will be carried out as stipulated herein.

Under the terms and conditions of the one-year plant guarantee - seeding, the Contractor shall be solely responsible for plant survival in seeded areas. Losses attributed to herbivores, disease, eutrophication, inappropriate hydrological regimes, drought, insect damage, fire, wind, or wave energies, ice scouring or vandalism shall not lower the minimum survival or coverage requirements.

At the end of the one-year plant guarantee - seeding, the Contracting Officer shall make a determination as to whether the seeded vegetation meets the conditions of the guarantee. Any seeded areas or portions thereof not meeting the requirements of the guarantee shall be reseeded in

accordance with the paragraph RE-SEEDING.

3.10.1 Re-seeding

For areas designated to be re-seeded, the Contracting Officer shall designate the seed mix to be used. The new seed mix shall comply with the original Contract quantities as shown on the plans, as solely determined by the Contracting Officer. Materials and installation shall be in accordance with the materials specifications and the paragraph INSTALLATION, respectively. Replacement seed shall be guaranteed for an additional 6 months starting from date of reseeding.

Seeding substrates of reseeded areas shall be re-tested in accordance with the subparagraph Soils Test. If the test results show that all or a portion of the substrate is not within the optimum ranges as specified by the soil testing laboratory, the Contractor shall incorporate additional soil amendments in accordance with subparagraph Application of Soil Amendments. Prior to application, these recommendations shall be approved by the Contracting Officer.

All labor, materials, equipment, and incidentals necessary to complete any reseeding work associated with the one-year plant guarantee - seeding shall be at no additional cost to the Government.

-- End of Section --

SECTION 02930

EXTERIOR PLANTING

Item Number 51: Low Marsh Plants
Item Number 52: High Marsh Plants
Item Number 53: Tidal Shrub Marsh Plants
Item Number 54: Upland Slope Plants
Item Number 55: Wetland Topsoil
Item Number 56: Marsh Fertilizer
Item Number 57: Shrub/Tree Fertilizer

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work under this section shall consist of furnishing and installing plants and soil amendments (if necessary) in accordance with the plans and specifications, and as directed by the Contracting Officer.

The Contractor shall make necessary arrangements to ensure an adequate supply of water to meet the needs of this Contract. The Contractor shall furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of all planting areas as required to complete the work specified under this section. No extra payment will be made from water coming from the Contractor's own source.

1.2 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 NURSERY AND LANDSCAPE ASSOCIATION (ANLA)

ANLA Z60.1	(1996) Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a; R 2001) Agricultural Liming Materials
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4972	(2001) pH of Soils
ASTM D 5268	(2002) Topsoil Used for Landscaping Purposes

1.3 SUBMITTALS

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

SD-03 Product Data

Plant Material Order; G, RO

Submit verification that plants have been ordered 6 months prior to the proposed first day of planting.

Low Marsh Plants; G, RO
High Marsh Plants; G, RO
Tidal Shrub Marsh Plants; G, RO
Upland Slope Plants; G, RO
Delivered Wetland Topsoil; G, RO
pH Adjusters; G, RO
Organic Material; G, RO
Soil Conditioner; G, RO
Marsh Fertilizer; G, RO
Shrub/Tree Fertilizer; G, RO

Submit data sheets and catalog cuts 30 calendar days prior to starting work. The data sheets shall show that materials meet the requirements specified herein. Data sheets shall include the following:

a. Plants. Classification, botanical name, common name, size, root type, quantity by species, and growing location.
b. Wetland Topsoil: Particle size and textural class.
c. pH adjusters. Calcium carbonate equivalent and sieve analysis.
d. Organic material: Composition and source.
e. Soil Conditioner: Composition and source.
f. Marsh fertilizer: Chemical analysis and composition percent.
g. Shrub/tree fertilizer: Chemical analysis and composition percent.

Delivery Schedule; G, RO

Submit a delivery schedule at least 10 calendar days prior to the first day of delivery.

Equipment; G, RO

Submit a list of equipment to be used for the planting operation 3 days prior to starting work.

Finished Grade and Wetland Topsoil; G, RO

At least 24 hours prior to the commencement of planting operations, the Contractor shall submit verification that finished grades are as indicated on the plans, and that the requirements for the placing of Wetland Topsoil, smooth grading, and compaction

have been met. The Contracting Officer shall approve this submittal prior to commencement of planting operations.

SD-04 Samples

Delivered Wetland Topsoil; G, RO

Submit samples taken from several locations at the source at least 15 calendar days prior to scheduled soil delivery.

Soil Amendments; G, RO

Submit 10 pound samples of any soil amendments to be used at least 15 calendar days prior to scheduled soil amendment delivery.

SD-06 Test Reports

Equipment Calibration; G, RO

Within 1 week of testing, submit a certification of calibration tests conducted on the equipment used during the seeding operations.

Soils Test; G, RO

Submit certified reports of laboratory tests, prepared by an independent soil testing laboratory, 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. The Contractor shall be aware that the results of soils tests for the transition slope areas must be submitted prior to ordering shrubs in case high soluble salt levels necessitate a substitution for Bayberry (*Myrica pennsylvanica*).

Soil Amendments Testing; G, RO

For bulk deliveries, submit a chemical analysis test at least 10 calendar days prior to scheduled soil amendment delivery.

SD-07 Certificates

One-year Plant Guarantee; G, RO

Submit a signed one-year plant guarantee at least 30 calendar days prior to commencement of planting operations.

Testing Laboratory Qualifications; G, RO

Submit qualifications of the commercial testing laboratory or Contractor's testing facilities when test reports are submitted.

SD-11 Closeout Submittals

As-Planted Plan

Submit as-built plan of plant material used, as well as a list of plant material quantities used, within two weeks following completion of planting operations.

1.4 Nurseries

The following nurseries specialize in growing wetland plant stock:

a. Pinelands Nursery and Supply, Columbus, New Jersey
(800) 667-2729
b. Greenbelt Native Plant Center, Staten Island, New York
(718) 667-2165
c. Wild Earth Native Plant Nursery, Freehold, New Jersey
(732) 308-9777
d. Sylva Native Nursery and Seed Company, New Freedom, Pennsylvania
(717) 227-0486
e. Ernst Conservation Seeds, Meadville, Pennsylvania
(800) 873-3321

1.5 ONE-YEAR PLANT GUARANTEE

The Contractor shall submit to the Contracting Officer, a written and signed one-year plant guarantee, which is conditional of 85 percent survival of the planted Contract quantity as detailed on the plans. Planting areas or portions thereof for which 85 percent survival is not reached shall be replanted once during the appropriate planting season for the planting area, to achieve a minimum of 85 percent of the planted Contract quantity.

The one-year plant guarantee period shall commence on the date of the completion of construction, and shall end 365 calendar days later. The Contractor shall provide the commencement and ending dates as part of the Periodic Schedule Updates and Progress Curves submitted under Section 01311 PROJECT SCHEDULE: BAR CHART. Following are the terms and conditions of the one-year plant guarantee:

a. The substrates of the planting areas will possess a pH greater than 4.5; the addition of soil amendments is allowable to attain this pH value.
b. Herbivory Fence will be installed as described in Section 02821 FENCING.
c. Plants will meet the requirements of the subparagraph Quality.
d. Planting operations will be carried out as stipulated herein.

Under the terms and conditions of the one-year plant guarantee, the Contractor shall be solely responsible for plant survival. Losses attributed to herbivores, disease, eutrophication, inappropriate hydrological regimes, drought, wind, wave energies or ice scouring shall not lower the minimum survival or coverage requirements.

At the end of the one-year plant guarantee, the Contracting Officer shall make a determination as to whether the plants planted in the planting areas meet the conditions of the guarantee. Any planting areas or portions thereof not meeting the requirements of the guarantee shall be replanted in accordance with the paragraph REPLANTING.

PART 2 PRODUCTS

2.1 PLANTS

The Contractor shall submit verification that a Plant Material Order has been submitted to the nursery. The order shall follow the Planting Tables as shown on the plans. Should the nursery state that any of the specified

plants will be unavailable or unsuitable in terms of size and quality of condition, the Contractor will immediately notify the Contracting Officer and provide a written list of potential substitutions. Upon approval, the Contracting Officer will supply the substitution list to the Contractor, at which time the revised plant order will be placed to the nursery.

2.1.1 Plant Species

Plants shall be first quality, nursery grown stock conforming to ANLA Z60.1. Low Marsh Plants, High Marsh Plants, Tidal Shrub Marsh Plants, and Upland Slope Plants listed on the Planting Tables on the plans shall be planted in the planting areas listed on the tables and shown on the plans. The Contractor shall following the root, height, caliper, spacing, and quanitity requirements listed on the tables.

2.1.2 Substitutions

Bayberry shall only be planted when soluble salt levels in the planting substrates measure less than 1.0 MMHOS/centimeter. If the soils tests shown that the soils in transition slope areas or any portion thereof are higher than 1.0 MMHOS/centimeter, the Contractor shall notify the Contracting Officer. The Contracting Officer shall provide the Contractor with an appropriate substitute species for the bayberry shrubs.

Any other plant substitutions will not be permitted without written request and approval from the Contracting Officer.

2.1.3 Quality

Plants shall be well-shaped, well-grown, vigorous plants having healthy and well branched root systems in accordance with ANLA Z60.1. Plants shall be free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement, and abrasion. Plants shall be free of shock or damage to branches, trunks or root systems that may during digging and preparation for shipment, method of shipment or actual shipment. Plant quality is determined by the growing conditions, method of shipment to maintain health of the root system, and growth of the plant as follows.

2.1.4 Growing Conditions

Plants shall be native to or well-suited to the growing conditions of the Project Site. Plants shall be grown under climatic conditions similar to those at the Project Site.

2.1.5 Plant Shipping

Peat pots and containers shall be sufficiently rigid to hold the root mass shape and protect the root mass during shipping.

2.1.6 Plant Size and Growth

Plants shall be furnished in sizes indicated. Plant measurements shall be in accordance with ANLA Z60.1. Plants larger in size than specified may be provided at no additional cost to the Government.

2.1.6.1 Peat Pots

Peat pot size shall be in accordance with ANLA Z60.1. Peat pots shall be grown over a duration of time for new fibrous roots to have developed and

for the root mass to retain its shape and hold together when removed from the pots.

2.1.6.2 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANLA Z60.1. Acceptable plants shall be well-shaped, full, bushy, compact, symmetrical plants of uniform color and texture. Side branches shall possess thick, closely massed foliage to the ground. Container size shall be in accordance with ANLA Z60.1. Containers shall be grown over a duration of time for new fibrous roots to have developed and for the root mass to retain its shape and hold together when removed from the containers.

2.1.6.3 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material shall have the height-to-spread ratio recommended by ANLA Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well-shaped and trimmed to form a symmetrical and tightly knit plant.

2.1.6.4 Deciduous Trees

A height to caliper relationship for deciduous trees shall be provided in accordance with ANLA Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed. The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

2.2 WETLAND TOPSOIL

Wetland Topsoil shall be medium- to fine-textured, sandy soil as defined in ASTM D 5268. Wetland Topsoil shall consist of natural, friable soil that is reasonably free from underlying subsoil, clay lumps, objectionable weeds, viable plants and plant parts, slag, cinders, stones, lumps of soil, sticks, roots, brush, trash or other material over a minimum 1 1/2 inch diameter. Wetland Topsoil shall be free from toxic substances or any material that might be harmful to plant growth or be a hindrance to grading, seeding, planting or maintenance operations. Wetland Topsoil material shall be approved by the Contracting Officer.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjusters and/or organic materials meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjusters

pH adjusters shall be an agricultural liming material in accordance with ASTM C 602. These materials may be ground limestone, hydrated lime, burnt lime, sulfur or shells.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. A minimum of 95 percent of the limestone shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. A minimum of 100 percent of hydrated lime shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. A minimum of 95 percent of the burnt lime shall pass through a No. 8 sieve and a minimum 35 percent shall pass through a No. 60 sieve.

2.3.2 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost or worm castings.

2.3.2.1 Bonemeal

Bonemeal shall be finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2.3.2.2 Rotted Manure

Rotted manure shall be unleached horse, chicken, or cattle manure containing a maximum 25 percent by volume of straw, sawdust or other bedding materials. 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.

2.3.2.3 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings or other wood waste materials that are free of stones, sticks, soil, and toxic substances harmful to plants, and are fully composted or stabilized with nitrogen.

2.3.2.4 Recycled Compost

Compost shall be from 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.

The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.3.2.5 Worm Castings

Worm castings shall be screened from worms and food source, and shall be commercially packaged.

2.3.3 Soil Conditioner

Soil conditioner shall be sand or gypsum.

2.3.3.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.3.2 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.4 PLANT FERTILIZER

2.4.1 Marsh Fertilizer

Marsh fertilizer shall be slow release, uniform in composition, with a 8-6-12 nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills or isobutylenediurea. Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.4.2 Shrub/Tree Fertilizer

Shrub/tree fertilizer shall be a slow release tablet with a 20-10-5 nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills or isobutylenediurea. Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.5 SURFACE EROSION CONTROL BLANKET

Surface Erosion Control Blanket material shall conform to the material requirements under Section 02921A SEEDING.

2.6 WATER

Unless otherwise directed, water shall be the responsibility of the Contractor. If freshwater is not available from local sources, the Contractor is responsible for supplying water from their own source. Water shall be free of oil, acid, alkalis, salts and other substances toxic to plant life.

PART 3 EXECUTION

3.1 DELIVERY, INSPECTION, STORAGE, AND HANDLING

3.1.1 Delivery

A Delivery Schedule shall be submitted to the Contracting Officer specifying the dates and approximate times of all deliveries of planting materials.

3.1.1.1 Plant Identification

Plants shall be legibly tagged with the proper botanical plant name and size.

3.1.1.2 Protection During Delivery

Plants shall be protected during delivery to prevent desiccation and damage to the branches, trunk, root system or earth ball. Branches shall be protected by tying-in. Exposed branches shall be covered during transport.

3.1.1.3 Soil Amendments

Soil amendments, if necessary, shall be delivered to the Project Site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk.

3.1.2 Inspection

The Contracting Officer will inspect all plants upon delivery and determine if they meet the requirements of the subparagraph Quality. Any plants not meeting these requirements shall be rejected. Unauthorized substitutions will also be rejected. Any rejected plants shall be replaced by the Contractor at no additional cost to the Government.

Other planting materials shall be inspected for compliance with the requirements herein. The following shall be rejected: open soil amendment containers or wet soil amendments and Wetland Topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the Project Site by the Contractor.

The Contractor shall be responsible for all certificates of inspection of plant materials that may be required by federal, state or other authorities to accompany each shipment of plants and on arrival; the certificate(s) shall be filed with the Contracting Officer.

3.1.3 Storage

Plants not installed on the day of arrival at the Project Site shall be stored and protected in designated areas from direct exposure to wind and sun. All areas used for temporary storage of low and high marsh plants must be enclosed with perimeter Herbivory Fence to prevent grazing by waterfowl and receive tidal inundation. Plants must not be stored on-site for more than 7 days before planting. Plants stored on-site for more than 7 days will be rejected and shall be replaced at no cost to the Government.

If planting is delayed for more than 6 hours after delivery, the Contractor shall take measures, approved by the Contracting Officer, to kept roots moist. After installation, low marsh, high marsh, and tidal shrub marsh plants will be watered naturally by diurnal tides.

Storage of other material shall be in designated areas. Soil amendments shall be stored in cool, dry locations away from contaminants.

3.1.4 Handling

Plants shall not be injured in handling. Cracking or breaking the earth ball of balled and burlapped plants shall be avoided. Plants shall not be handled by the trunk or stems. Materials shall not be dropped from

vehicles.

3.2 PLANTING PERIODS, CONDITIONS, AND EQUIPMENT

3.2.1 Planting Periods

Planting periods shall be as follows:

Period	Dates
LOW MARSH, HIGH MARSH, AND TIDAL SHRUB MARSH	
Spring Season	April 1 to May 15
UPLAND SLOPE	
Spring Season	April 15 to May 31

3.2.2 Timing

This section covers the the addition of soil amendments for all other planting areas besides upland slopes and lawn areas. Soil amendments for the upland slopes and lawn areas shall be added and tilling shall be completed prior to seeding as described under Section 02921A SEEDING. The addition of soil amendments for all other planting areas shall be completed prior to the commencement of planting operations. For the upland slope areas, planting operations shall commence subsequent to the completion of seeding operations.

3.2.3 Climate Conditions

Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped as directed by the Contracting Officer. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted for approval.

3.2.4 Finished Grade and Wetland Topsoil

Prior to the commencement of the planting operation, the Contractor shall verify that finished grades are as indicated on drawings, and the placing of Wetland Topsoil, smooth grading, and compaction requirements, where applicable, have been completed in accordance with Section 02300AEARTHWORK. The Contractor shall also check that the depth of wetland topsoil is at least 6 inches. If the depth is less than 6 inches, additional topsoil shall be added to bring the topsoil layer to 6 inches at no additional cost to the Government. After grading is complete, heavy equipment is prohibited from entering planting areas.

3.2.5 Equipment Calibration

Immediately prior to the commencement of planting 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.

3.2.6 TESTING

3.2.6.1 Soils Test

Prior to placement of Wetland Topsoil as directed under Section 02300A EARTHWORK, the Contractor shall test no less than 5 samples of delivered Wetland Topsoil in accordance with ASTM D 5268 and ASTM D 4972 to determine the pH, organic matter, soluble salt, and nutrient contents. Copies of the test results and testing laboratory qualifications shall be submitted to the Contracting Officer. Subsamples collected at 6 to 8 random locations in the soil stockpile shall be composited to create one test sample. New samples shall be collected and composited to create each test sample.

3.3 SITE PREPARATION

3.3.1 Application of Soil Amendments

If the soil testing results show that the delivered Wetland Topsoil is not within the optimum ranges as specified by the soil testing laboratory for the species to be planted as shown on the Planting Tables on the plans, the Contractor shall obtain recommendations from the laboratory for quantities and types of soil amendments required to meet the optimum conditions. Prior to application, these recommendations shall be subject to approval by the Contracting Officer. No additional soil amendments shall be added to seeded upland slope or lawn areas at this time.

3.3.2 Applying pH Adjuster

The pH adjuster shall be applied as recommended by the soil test and approved by the Contracting Officer. The pH adjuster shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage operation.

3.3.3 Applying Soil Conditioner

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

3.3.4 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method approved by the Contracting Officer. 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 Wetland Topsoil requirements.

3.3.5 Planting Substrate

Subsequent to the application of soil amendments (if necessary) and at least one full diurnal tidal cycle prior to planting, the Contractor shall fine grade by hand the low marsh, high marsh, and tidal shrub marsh areas to a reasonably smooth finish. Any areas that do not remain at their

proper grade shall be restored to the proper grade prior to planting. All wrack and debris that has collected in the low marsh, high marsh, and tidal shrub marsh areas prior to planting shall be thoroughly removed and disposed of off-site. These areas shall be raked clean and smooth.

3.4 INSTALLATION

Prior to commencement of planting, the Contractor shall examine the planting areas and conditions and notify the Contracting Officer, in writing, of conditions detrimental to the proper and timely completion of the work. The Contractor shall not proceed with planting until unsatisfactory conditions have been corrected in an acceptable manner, as approved by the the Contracting Officer. Prior to plant installation, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION.

Planting shall be performed under free-flow tidal conditions. However, plant installation shall be completed "in the dry", i.e. while the tide is below the elevations of the area being planted. The Contractor shall schedule planting on a daily basis to account for the tidal cycles. Planting holes shall not be dug while planting substrates are inundated.

Subsequent to completion of planting, the Contractor shall only enter planted areas when absolutely necessary for the completion of the Project. There shall be no exceptions.

3.4.1 Obstructions Below Ground

When obstructions below finished grades prevent planting operations, the Contractor shall submit a plan showing proposed adjustments to location, type of plant, and/or planting method to the Contracting Officer.

3.4.2 Planting

3.4.2.1 Surface Erosion Control Blanket

Subsequent to application of soil amendments and prior to planting, Surface Erosion Control Blanket shall be installed in the tidal shrub marsh areas as shown on the plans in accordance with manufacturer's instructions. Installation in the tidal shrub marsh areas shall occur concurrently with installation in the upland slope areas as described in Section 02921A SEEDING. Placement of the material shall be accomplished without deviation to finished grade.

3.4.2.2 Herbivory Fence

Herbivory Fence shall be installed after final grades in the low and high marsh planting areas are completed and approved by the Contracting Officer. Herbivory Fence shall be installed prior to or concurrently with installation of the low and high marsh plants. Under no circumstances are these plants to be planted outside the containment of a satisfactorily installed Herbivory Fence.

3.4.2.3 Coir Fiber Logs

The Contractor shall install Coir Fiber Logs as described in Section 02941 COIR FIBER LOG. Subsequent to log installation, the Contractor shall install low and high marsh plants in the logs. Holes shall be created in the logs by cutting openings across the top of the logs in a “zig-zag”

pattern, spaced as indicated on the plans. The openings shall be cut deep enough so that the plant is installed at a depth 1 inch deeper than grown in the nursery.

3.4.2.4 Coir Fiber Matting

The Contractor shall install Coir Fiber Matting as described in Section 02940 COIR FIBER MATTING. Subsequent to matting installation, the Contractor shall ready the matting for planting low and high marsh plants using one of the following methods.

a. Holes in the matting shall be created by pulling the matting apart by hand to accommodate the root system.

b. Holes in the matting shall be created by cutting a cross into the matting to accommodate the root system.

Planting holes shall be dug in the Wetland Topsoil and Low and High Marsh plants shall be installed through the matting as detailed in subparagraph Peat Pots.

3.4.2.5 Peat Pots

For Low Marsh Plants and High Marsh Plants only, of marsh fertilizer shall be placed in the bottom of each planting hole prior to placing a plant. Fertilizer dispenser shall be calibrated daily for the dose specified. At no time shall fertilizer be placed in the water column or on top of the soil surface or matting. Soluble fertilizers should not be placed in direct contact with the rootstocks.

Peat pots shall be planted at a depth of no more than 1 inch deeper than grown in the nursery. The top of the rootstock mass shall be a minimum of 1 inch below the matting surface. Plants shall be set plumb, with the root system oriented downward, and held in position until sufficient soil has been firmly placed by hand around the root mass. The matting shall be pushed back together over the filled planting hole by hand. It shall be unacceptable to step on or around planting holes for the purpose of placing backfill.

3.4.2.6 Tidal Shrubs and Upland Trees

The Contractor shall ready the surface erosion control blanket for planting tidal shrubs and upland trees using one of the following methods.

a. Holes in the blanket shall be created by pulling the blanket apart by hand to accommodate the root system.

b. Holes in the blanket shall be created by cutting a cross into the blanket to accommodate the root system.

Planting pits shall be dug in the Wetland Topsoil and Upland Topsoil through the matting approximately 4 inches wider than the stock size. To encourage well-aerated soil to be available to the root system for favorable root growth, plant pits shall be constructed with sides sloping towards the base; vertical sides shall not be used.

Prior to placing a shrub or tree in the planting pit through the surface erosion control blanket, a shrub/tree fertilizer tablet shall be placed in the bottom of each plant pit. At no time shall fertilizer be placed in the

water column or on top of the soil surface. Soluble fertilizers should not be placed in direct contact with the rootstocks.

All shrubs and trees, except for bayberry shrubs, shall be planted 1 inch higher than grown in the nursery. The bayberry shrubs shall be planted 1 inch deeper than grown in the nursery. The tops of the rootstock mass of all the shrubs shall be a minimum of 1 inch below the soil surface. Shrubs shall be set plumb, with the root system oriented downward, and held in position until sufficient soil has been firmly placed around the root mass. All shrubs and trees, except bayberry shrubs, shall be slightly higher than the surrounding grade; bayberry shall be set even with the surrounding grade.

3.4.3 Watering

The upland slope planting areas shall be watered within 8 hours of completion of planting operations until completely saturated. Clean, freshwater shall be applied as often as required to maintain a moist seedbed for optimum germination, and to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over planted areas. Watering of other adjacent areas or vegetation shall be prevented.

3.5 AS-PLANTED PLANS

The Contractor shall submit two copies of an As-Planted Plan to the Contracting Officer. Unless directed differently by the Contracting Officer, these plans shall be drawn to a scale of 1 inch = 50 feet and shall show as-built locations for the plant material used. A list of the quantities of each species installed in each of the planting blocks or areas shall also be submitted with the plans. Any deviations from the original planting plans, including approved substitutions, shall be clearly marked and documented.

3.6 MAINTENANCE DURING CONSTRUCTION

Installed plants shall be maintained in a healthy growing condition. Maintenance of planting areas during construction shall include preventing the intrusion of weeds, grass, and other undesired vegetation, watering, and adjusting grades for settling. Grass, weeds, and other undesired vegetation shall be removed before reaching a maximum height of 3 inches including the root system. When settling occurs, additional backfill soil shall be added to the plant pit until the backfill level is equal to the surrounding grade. Serious settling that changes the setting of the plant in relation to the maximum depth at which it was grown requires replanting in accordance with paragraph INSTALLATION.

Any planted areas disturbed prior to completion of construction, as determined by the Contracting Officer, shall be repaired or reinstalled in accordance with the paragraph INSTALLATION.

3.7 RESTORATION AND CLEAN UP

When planting operations have been completed, the Contractor shall restore any damaged areas to their original conditions.

Planting work areas shall also be cleaned up, including the removal of any excess materials. The Contractor shall remove damaged, excess, and waste

materials from the Project Site and dispose of the materials off Government property.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the planting operations in an area, the area shall be protected against traffic or other use by erecting barricades and/or providing signage as directed by the Contracting Officer.

3.9 REPLANTING

At the end of the one-year plant guarantee, the Contracting Officer shall make a determination as to whether the plants planted in the planting areas meet the conditions of the guarantee. For non-surviving plants, the Contracting Officer shall select the species to be replanted. The new plantings shall comply with the original Contract quantities as shown on the plans, as solely determined by the Contracting Officer. Materials and installation shall be in accordance with the materials specifications and the paragraph INSTALLATION, respectively. Replacement plants shall be guaranteed for an additional 6 months starting from date of replanting.

The planting substrates of replanted areas shall be re-tested in accordance with subparagraph Soils Test. If the test results show that all or a portion of the substrate is not within the optimum ranges as specified by the soil testing laboratory, the Contractor shall incorporate additional soil amendments in accordance with subparagraph Application of Soil Amendments. Prior to application, these recommendations shall be approved by the Contracting Officer. At the direction of the Contracting Officer, the Contractor shall install and maintain additional Herbivory Fence around the replanted areas in accordance with Section 02821 FENCING.

All labor, materials, equipment, and incidentals necessary to complete any replanting work associated with the one-year plant guarantee shall be at no additional cost to the Government.

-- End of Section --

SECTION 02940

COIR FIBER MATTING

Item Number 58: Coir Fiber Matting

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work under this section shall include the labor, materials, equipment, tools, and incidentals necessary to furnish, install, and secure Coir Fiber Matting in accordance with the plans and specifications and as directed by the Contracting Officer.

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 1777	(1996) Measuring Thickness of Textile Materials
ASTM D 5035	(1995) Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5261	(1992; R 1996) Measuring Mass per Unit Area of Geotextiles

1.3 SUBMITTALS

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

SD-03 Product Data

Coir Fiber Matting; G, RO.
Submit product information 30 days prior to starting work.

Finished Grade; G, RO.
At least 8 hours prior to the installation of the Coir Fiber Matting, the Contractor shall submit verification that finished grades are as indicated on the plans. The Contracting Officer shall approve this submittal prior to installation of the Coir Fiber Matting.

SD-04 Samples

Coir Fiber Matting; G, RO.
Submit a 12 inch x 12 inch sample of the matting at least 15 calendar days prior to start of work.

PART 2 PRODUCTS

2.1 COIR FIBER MATTING

The installation of Coir Fiber Matting shall require the following materials:

Matting: Matting shall be rolls of machine spun bristle coconut fiber woven into a high strength matrix. Matting shall conform to the properties listed below:

Property	Test Value	Test Method
Mass Per Unit Area	20.6 ounces/square yard	ASTM D 5261
Thickness	0.30 inch	ASTM D 1777
Tensile Strength	1348 x 626 pounds/foot	ASTM D 5035
Elongation	34 percent x 38 percent	ASTM D 5035

Staples: Staples shall be made of 0.125-inch diameter new steel wire formed into a "u" shape not less than 12 inches in length with a throat of 1 inch in width.

Coir Twine: Coir twine shall be made of freshwater cured brown bristle coir machine twisted to a uniform diameter of 0.28 inch.

PART 3 INSTALLATION

3.1 FINISHED GRADE

The Contractor shall verify that finished grades are as indicated on the plans prior to installation of the Coir Fiber Matting. After grading is complete, heavy equipment is prohibited from entering areas where matting is to be installed.

3.2 TIMING

The Contractor shall schedule installation of the Coir Fiber Matting to coincide with advantageous low tide cycles. Installation shall not proceed in areas which are inundated by tidal waters. Work shall proceed in only those areas during a time at which the areas are drained of tidal waters.

Coir Fiber Matting shall be installed subsequent to the installation of the Riprap for Wetland Protection. Coir Fiber Matting shall be installed immediately after final grading, subsequent to installation of Coir Fiber Log and application of soil amendments, if necessary, and prior to planting.

3.2 INSTALLATION

Coir Fiber Matting shall be installed in the areas as shown on the plans. Matting shall be placed on a smooth soil surface free from stones, clods or debris that may prevent the contact of the matting with the soil. The Contractor shall take care to preserve the required line, grade, and cross sections of the area covered. Matting shall be unrolled perpendicular to the site contours and shall be applied without stretching so that it will lie smoothly but loosely on the soil surface.

Coir Fiber Matting shall be installed following the steps outlined below and as directed by the Contracting Officer:

1. Initial (top of slope) and terminal (bottom of slope) anchor trenches shall be dug parallel to the site contours of the matting area as detailed on the plans. Soil dug from the trenches shall be stockpiled along the length of the trench for use as backfill in a later step. The Contracting Officer shall approve the location of the anchor trenches prior to digging.

2. Trenches for intermittent check slots shall be dug parallel to the contours at 50 foot intervals that extend the entire width of the mat, as detailed on the plans. Soil dug from the trenches shall be stockpiled along the length of the trench for use as backfill in a later step. The Contracting Officer shall approve the location of the check slot trenches prior to digging.

3. Outside anchor trenches shall be dug perpendicular to contours at the end of the matting areas, as indicated on the plans or as directed by the Contracting Officer. Soil dug from the trenches shall be stockpiled along the length of the trench for use as backfill in a later step. The Contracting Officer shall approve the location of the anchor trenches prior to digging.

4. Beginning at the top of slope of the matting area, the end of the first roll shall be placed in the initial anchor trench and secured with staples as shown on the plans. Adjacent rolls shall be placed in the initial anchor trench, overlapping the preceding roll a minimum of 3 inches, and secured with staples. The trench shall be backfilled with the stockpiled soil, and tamped firmly in place with a hand-tamper.

5. Matting shall be rolled over the tamped anchor trench, perpendicular to the site contours, to the next check slot trench and secured with staples. Adjacent rolls shall be rolled up to the check slot and secured concurrently to maintain the 3 inch overlap.

6. Matting shall be folded and secured snugly into the check slots. The matting shall be laid in the bottom of the check slot trench and fold back against itself as detailed on the plans. Staples shall be secured through both layers of the matting. The trench shall be backfilled with the stockpiled soil and tamped firmly in place with a hand-tamper. Matting shall continue to be unrolled perpendicular to the contours to the next check slot or terminal anchor trench.

7. Where one roll of matting ends and a second roll begins, the end of the first matting shall be buried in a narrow trench at least 5 inches deep and tamped firmly in place with a hand-tamper. The end of the next roll shall be brought over the buried end of the first roll so that there will be a 6 inch overlap. The new roll shall be folded and secured into a check slot.

8. Steps 5, 6, and 7 shall be repeated until the terminal anchor trench is reached. The matting shall be shall be buried in the terminal anchor trenches as in step 4, backfilled with the stockpiled soil, tamped firmly in place with a hand-tamper, and secured with staples. Matting may be cut to fit in the terminal anchor trench.

9. After an adjacent roll (top of slope and bottom of slope) have been secured in the terminal anchor trench, the outside ends of the matting shall be shall be buried in the outside anchor trenches as in step 4, backfilled with the stockpiled soil, tamped firmly in place with a hand-tamper, and secured with staples. Matting may be cut to fit in the outside anchor trenches.

Staples around matting perimeter, junctions, and check slots shall be spaced approximately 10 inches apart. The remaining areas of the matting shall be spaced at approximately 1 staple per square yard.

The Contracting Officer may require adjustments in the trenching or stapling requirements to fit individual slope conditions.

3.3 MAINTENANCE

The Contractor shall continuously maintain the integrity of the Coir Fiber Matting, including providing all necessary labor, equipment, and materials, until all construction activities have been completed. The Contractor shall inspect the Coir Fiber Matting immediately after each storm that occurs throughout the life of the Contract. Any deficiencies shall be corrected immediately to the satisfaction of the Contracting Officer. Should the Coir Fiber Matting become damaged or otherwise ineffective, the Contractor shall immediately repair or replace defective or damaged portions. Torn or punctured sections of the matting shall be repaired by the installation of a patch conisting of an additional layer of coir twine over the damaged area.

The Coir Fiber Matting will naturally degrade and will not require removal.

-- End of Section --

SECTION 02941

COIR FIBER LOG

Item Number 59: Coir Fiber Log

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Work under this section shall include the labor, materials, equipment, tools, and incidentals necessary to furnish, install, and secure Coir Fiber Logs in accordance with the plans and specifications and as directed by the Contracting Officer.

1.2 SUBMITTALS

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

SD-03 Product Data

Coir Fiber Log; G, RO.

Submit product information 30 days prior to starting work.

Finished Grade; G, RO.

At least 8 hours prior to the installation of the Coir Fiber Log, the Contractor shall submit verification that finished grades are as indicated on the plans. The Contracting Officer shall approve this submittal prior to installation of the Coir Fiber Log.

SD-04 Samples

Coir Fiber Log; G, RO.

Submit a 12 inch long sample of the log at least 15 calendar days prior to start of work.

PART 2 PRODUCTS

2.1 COIR FIBER LOG

The installation of Coir Fiber Logs shall require the following materials:

Logs: Logs shall be 12 inch diameter tubes of coconut fiber. Outer netting shall be made of machine spun coir twine. Eye size of the netting shall be not larger than 2 inch x 2 inch with knots at each junction. Mattress coir shall be uniformly stuffed to the netting. The minimum weight of the stuffed coir roll shall be 5 pounds per foot. Both bristle and mattress coir shall be obtained from freshwater cured coconut husks.

Coir Twine: Coir twine shall be made of freshwater cured brown bristle coir machine twisted to a uniform diameter of 0.28 inch.

Hardwood stakes: Hardwood stakes shall be 4 foot x 2 inch x 2 inch. A notch with a depth of 3/4 inch shall be installed a minimum of 5 inches from the top of the stake.

PART 3 INSTALLATION

3.1 FINISHED GRADE

The Contractor shall verify that finished grades are as indicated on the plans prior to installation of the Coir Fiber Log. After grading is complete, heavy equipment is prohibited from entering areas where log is to be installed.

3.2 TIMING

Installation shall not proceed in areas which are inundated by tidal waters. Work shall proceed in only those areas during a time at which the areas are drained of tidal waters. The Contractor shall schedule installation of the Coir Fiber Logs to coincide with advantageous low tide cycles.

Coir Fiber Logs shall be installed immediately after final grading and prior to Coir Fiber Matting and planting. Coir Fiber Logs shall be installed immediately after final grading, subsequent to the application of soil amendments, if necessary, and prior to planting and installation of Coir Fiber Matting.

3.3 INSTALLATION

Coir Fiber Logs shall be installed in the areas as shown on the plans. Installation shall follow the steps outlined below and as directed by the Contracting Officer:

1. Logs shall be placed along the inside edge of the Riprap for Wetland Protection or bulkhead, as shown on the plans.

2. The logs shall be installed so that a constant depth of 1/2 of the coir log's height is buried and that the top of the log is 6 inches above the proposed grade as shown on the drawings.

3. Ends of adjacent logs shall be tied together with coir twine. At least 3 passes with the twine shall be made in the end netting between adjacent logs.

4. Hardwood stakes shall be driven into the ground to a depth as shown on the plans, or adequately anchored to the satisfaction of the Contracting Officer if rock is encountered. Stakes shall be spaced as shown on the plans. Stakes shall be driven through two loops of the coir-fiber netting on a log. Logs shall be cinched at the bottom by tying the stakes together with coir twine at the notches as detailed on the plans. The coir twine shall be pulled taut to secure the log.

5. Where a log does not abut another log, the end shall be bent landward and embedded into the ground to prevent water collection behind the log and subsequent dislodging of the logs. The

Contractor shall trench in both ends of the continuous line of coir logs, where shown on the plans and as directed by the Contracting Officer.

3.4 MAINTENANCE

The Contractor shall continuously maintain the integrity of the Coir Fiber Logs, including providing all necessary labor, equipment, and materials, until all construction activities have been completed. The Contractor shall inspect the Coir Fiber Logs immediately after each storm that occurs throughout the life of the Contract. Any deficiencies shall be corrected immediately to the satisfaction of the Contracting Officer. Should the Coir Fiber Logs become damaged or otherwise ineffective, the Contractor shall immediately repair or replace defective or damaged portions. Torn or punctured logs shall be repaired by the installation of a patch consisting of an additional layer of coir twine over the damaged area.

The Coir Fiber Log and stakes will naturally degrade and will not require removal.

-- End of Section --

SECTION 03100A

STRUCTURAL CONCRETE FORMWORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein, including formwork related to the concrete cap for the bulkhead wall and cast-in-place elements of the drainage structures.

1.2 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	(2001) Guide to Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 578	(2003a) Rigid, Cellular Polystyrene Thermal Insulation

DEPARTMENT OF COMMERCE (DOC)

PS1	(1995) Construction and Industrial Plywood (APA V995)

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Concrete Formwork

Drawings showing details of formwork including, dimensions of fiber voids, joints, supports, studding and shoring, and sequence of form and shoring removal.

SD-03 Product Data

Concrete Formwork

Manufacturer's data including literature describing form materials, accessories, and form releasing agents.

SD-04 Samples

Fiber Voids

One sample unit of fiber voids prior to installation of the voids.

SD-05 Design Data

Design

Design analysis and calculations for form design and methodology used in the design.

SD-07 Certificates

Fiber Voids

Certificates attesting that fiber voids conform to the specified requirements.

SD-08 Manufacturer's Instructions

Form Releasing Agents

Manufacturer's recommendation on method and rate of application of form releasing agents.

1.4 DESIGN

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

1.5 STORAGE AND HANDLING

Fiber voids shall be stored above ground level in a dry location. Fiber voids shall be kept dry until installed and overlaid with concrete.

PART 2 PRODUCTS

2.1 FORM MATERIALS

2.1.1 Forms For Class A and Class B Finish

Forms for Class A and Class B finished surfaces shall be plywood panels conforming to DOC PS 1, Grade B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels. Forms for the concrete bulkhead cap must provide a watertight enclosure before reinforcement and concrete placement. Underwater excavation and dewatering shall be in accordance with applicable provisions of Sections 02222 and 02226.

2.1.2 Forms For Class C Finish

Forms for Class C finished surfaces shall be shiplap lumber; plywood conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II; tempered concrete form hardboard conforming to AHA A135.4; other approved concrete form material; or steel, except that steel lining on wood sheathing shall not be used.

2.1.3 Forms For Class D Finish

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.1.4 Form Ties

Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter. Removable tie rods shall be not more than 1-1/2 inches in diameter.

2.1.5 Form Releasing Agents

Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents 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.

2.2 PRECAST CONCRETE

Precast concrete units shall have a compressive strength of not less than 2500 psi, reinforced with 6 inch by 6 inch by W1.4 WWF wire mesh, and 12 inches (height) by 3 feet (length) by 1-5/8 inches (thickness) in size unless indicated otherwise on the Contract Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE and conforming to construction tolerance given in TABLE 1. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond

breaker.

3.2 CHAMFERING

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms.

3.3 COATING

Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4 REMOVAL OF FORMS

Forms shall be removed in a manner that will prevent injury to the concrete and ensure the complete safety of the structure. Formwork for cap, and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed until the structural units are strong enough to carry their own weight and any other construction or natural loads. In no case will supporting forms or shores be removed before the concrete strength has reached 70 percent of design strengths as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:	In any 10 feet of length ----- 1/4 inch
a. In the lines and surfaces of columns, piers, walls and in arises	Maximum for entire length ----- 1 inch
b. For exposed corner columns, control-joint grooves, and other conspicuous lines	In any 20 feet of length ----- 1/4 inch Maximum for entire length ---- 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:	In any 10 feet of length ----- 1/4 inch In any bay or in any 20 feet of length ---------- 3/8 inch
b. In exposed lintels, sills,	In any bay or in any 20 feet of

TABLE 1

TOLERANCES FOR FORMED SURFACES

	parapets, horizontal grooves, and other conspicuous lines	length ---------- 1/4 inch Maximum for entire length ---- 1/2 inch
3.	Variation of the linear building lines from established position in plan	In any 20 feet ---------- 1/2 inch Maximum ---------- 1 inch
4.	Variation of distance between walls, columns, partitions	1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay, and not more than 1 inch total variation
5.	Variation in the sizes and locations of sleeves, floor openings, and wall opening	Minus ---------- 1/4 inch Plus ---------- 1/2 inch
6.	Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls	Minus ---------- 1/4 inch Plus ---------- 1/2 inch
7.	Footings:	
a.	Variation of dimensions in plan when formed or plus 3 inches when placed against unformed excavation	Minus ---------- 1/2 inch Plus ---------- 2 inches
b.	Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than ---------- 2 inches
c.	Reduction in thickness	Minus ---------- 5 percent of specified thickness

-- End of Section --

SECTION 03150A

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, installing (as applicable) all materials, labor, equipment, tools, and incidentals necessary to complete the work specified herein for cast-in-place concrete structures.

1.2 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 111	(1983; R 2000) Inorganic Matter or Ash in Bituminous Materials

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 109	(2003) Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled
ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 480	(2003b) General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A 570	(1995) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM B 152	(2000) Copper Sheet, Strip, Plate, and Rolled Bar
ASTM B 370	(1998) Copper Sheet and Strip for Building Construction
ASTM D 4	(1986; R 1998) Bitumen Content
ASTM D 6	(1995; R 2000el) Loss on Heating of Oil and Asphaltic Compounds
ASTM D 412	(1998a, R 2002el2) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 471	(1998el) Rubber Property - Effect of

	Liquids
ASTM D 1190	(1994) Concrete Joint Sealer, Hot-Poured Elastic Type
ASTM D 1191	(1984; R 1994) Test Methods for Concrete Joint Sealers
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

CORPS OF ENGINEERS (COE)

COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Waterstops; G, RO

Shop drawings and fabrication drawings provided by the manufacturer or prepared by the Contractor.

SD-03 Product Data

Preformed Expansion Joint Filler; G, RO

Sealant; G, RO

Waterstops; G, RO

Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals; and waterstops.

SD-07 Certificates

Preformed Expansion Joint Filler; G, RO

Sealant; G, RO

Waterstops; G, RO

Certificates of compliance stating that the joint filler and sealant materials and waterstops conform to the requirements specified.

SD-08 Manufacturer's Instructions

Preformed Expansion Joint Filler; G, RO

Sealant; G, RO

Waterstops; G, RO

Manufacturer's recommended instructions for installing preformed fillers, field-molded sealants; preformed compression seals; and waterstops; and for splicing non-metallic waterstops.

1.4 DELIVERY AND STORAGE

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 PRODUCTS

2.1 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

2.2 SEALANT

Joint sealant shall conform to the following:

2.2.1 Hot-Poured Type

ASTM D 1190 tested in accordance with ASTM D 1191.

2.3 WATERSTOPS

Intersection and change of direction waterstops shall be shop fabricated.

2.3.1 Flexible Metal

Copper waterstops shall conform to ASTM B 152 and ASTM B 370, O60 soft anneal temper and 20 oz mass per sq ft sheet thickness. Stainless steel waterstops shall conform to ASTM A 167 and ASTM A 480, UNS S0453 (Type 304L), and 20 gauge thick strip.

2.3.2 Rigid Metal

Flat steel waterstops shall conform to ASTM A 109, No. 2 (half hard) temper, No. 2 edge, No. 1 (matte or dull) finish or ASTM A 570, Grade 40.

2.3.3 Non-Metallic

Non-metallic waterstops shall be manufactured from a prime virgin resin; reclaimed material is not acceptable. The compound shall contain plasticizers, stabilizers, and other additives to meet specified requirements. Rubber waterstops shall conform to COE CRD-C 513. Polyvinylchloride waterstops shall conform to COE CRD-C 572. Thermoplastic elastomeric rubber waterstops shall conform to ASTM D 471.

2.3.4 Non-Metallic Hydrophilic

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water shall conform to ASTM D 412 as follows: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness shall be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F shall be 3 to 1 minimum.

2.3.5 Preformed Elastic Adhesive

Preformed plastic adhesive waterstops shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, and shall contain no solvents, asbestos, irritating fumes or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength.

2.3.5.1 Chemical Composition

The chemical composition of the sealing compound shall meet the requirements shown below.

COMPONENT	TEST	PERCENT BY WEIGHT MIN.	MAX.
Bitumen (Hydrocarbon plastic)	ASTM D 4	50	70
Inert Mineral Filler	AASHTO T 111	30	50
Volatile Matter	ASTM D 6 --		2

2.3.5.2 Adhesion Under Hydrostatic Pressure

The sealing compound shall not leak at the joints for a period of 24 hours under a vertical 6 foot head pressure. In a separate test, the sealing compound shall not leak under a horizontal pressure of 10 psi which is reached by slowly applying increments of 2 psi every minute.

2.3.5.3 Sag of Flow Resistance

No sagging shall be detected when tested as follows: Fill a wooden form 1 inch wide and 6 inches long flush with sealing compound and place in an oven at 135 degrees F in a vertical position for 5 days.

2.3.5.4 Chemical Resistance

The sealing compound when immersed separately in a 5% solution of caustic potash, a 5% solution of hydrochloric acid, 5% solution of sulfuric acid and a saturated hydrogen sulfide solution for 30 days at ambient room temperature shall show no visible deterioration.

PART 3 EXECUTION

3.1 JOINTS

Joints shall be installed at locations indicated and as authorized.

3.1.1 Contraction Joints

Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting the concrete with a saw after concrete has set. Joints shall be approximately 1/8 inch wide and shall extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

3.1.2 Expansion Joints

Preformed expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top thereof to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of 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.

3.1.3 Joint Sealant

Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

3.2 WATERSTOPS, INSTALLATION AND SPLICES

Waterstops shall be installed at the locations shown to form a continuous water-tight diaphragm. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be repaired or replaced. Exposed waterstops shall be protected during application of form release agents to avoid being coated. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Splices shall be made by certified trained personnel using approved equipment and procedures.

3.2.1 Copper And Stainless Steel

Splices in copper waterstops shall be lap joints made by brazing. Splices in stainless steel waterstops shall be welded using a TIG or MIG process utilizing a weld rod to match the stainless. All welds shall be annealed to maintain physical properties. No carbon flame shall be used in the

annealing process. Damaged waterstops shall be repaired by removing damaged portions and patching. Patches shall overlap a minimum of 1 inch onto undamaged portion of the waterstop.

3.2.2 Flat Steel

Splices in flat steel waterstops shall be properly aligned, butt welded, and cleaned of excessive material.

3.2.3 Non-Metallic

Fittings shall be shop made using a machine specifically designed to mechanically weld the waterstop. A miter guide, proper fixturing (profile dependant), and portable power saw shall be used to miter cut the ends to be joined to ensure good alignment and contact between joined surfaces. The splicing of straight lengths shall be done by squaring the ends to be joined. Continuity of the characteristic features of the cross section of the waterstop (ribs, tabular center axis, protrusions, etc.) shall be maintained across the splice.

3.2.3.1 Rubber Waterstop

Splices shall be vulcanized or shall be made using cold bond adhesive as recommended by the manufacturer. Splices for TPE-R shall be as specified for PVC.

3.2.3.2 Polyvinyl Chloride Waterstop

Splices shall be made by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. The correct temperature shall be used to sufficiently melt without charring the plastic. The spliced area, when cooled, shall show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

3.2.3.3 Quality Assurance

Edge welding will not be permitted. Centerbulbs shall be compressed or closed when welding to non-centerbulb type. Waterstop splicing defects which are unacceptable include, but are not limited to the following: 1) Tensile strength less than 80 percent of parent section. 2) Free lap joints. 3) Misalignment of centerbulb, ribs, and end bulbs greater than 1/16 inch. 4) Misalignment which reduces waterstop cross section more than 15 percent. 5) Bond failure at joint deeper than 1/16 inch or 15 percent of material thickness. 6) Misalignment of waterstop splice resulting in misalignment of waterstop in excess of 1/2 inch in 10 feet. 7) Visible porosity in the weld area, including pin holes. 8) Charred or burnt material. 9) Bubbles or inadequate bonding. 10) Visible signs of splice separation when cooled splice is bent by hand at a sharp angle.

3.2.4 Non-Metallic Hydrophilic Waterstop Installation

Ends to be joined shall be miter cut with sharp knife or shears. The ends shall be adhered with cyanacryiate (super glue) adhesive. When joining hydrophilic type waterstop to PVC waterstop, the hydrophilic waterstop shall be positioned as shown on the drawings. A liberal amount of a single component hydrophilic sealant shall be applied to the junction to complete the transition.

3.2.5 Preformed Plastic Adhesive Installation

The installation of preformed plastic adhesive waterstops shall be a prime, peel, place and pour procedure. Joint surfaces shall be clean and dry before priming and just prior to placing the sealing strips. The end of each strip shall be spliced to the next strip with a 1 inch overlap; the overlap shall be pressed firmly to release trapped air. During damp or cold conditions the joint surface shall be flashed with a safe, direct flame to warm and dry the surface adequately; the sealing strips shall be dipped in warm water to soften the material to achieve maximum bond to the concrete surface.

3.3 CONSTRUCTION JOINTS

Construction joints are specified in Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE except that construction joints coinciding with expansion and contraction joints shall be treated as expansion or contraction joints as applicable.

-- End of Section --

SECTION 03200A

CONCRETE REINFORCEMENT

Item Number 27a: Plain Deformed Steel Bars
Item Number 27b: Epoxy-Coated Deformed Steel Bars

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 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 318/318R	(2002) Building Code Requirements for Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185	(2002) Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 615/A 615M	(2003a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 775A 775M	(2001) Epoxy-Coated Reinforcement Steel Bars

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4	(1998) Structural Welding Code - Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 1MSP	(2001) Manual of Standard Practice

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

Qualifications

A list of names of qualified welders.

SD-02 Shop Drawings

Concrete Reinforcement System; G, DO

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-07 Certificates

Reinforcing Steel; G, RO

Certified copies of mill reports attesting that the reinforcing steel (deformed steel bars) furnished meets the requirements specified, prior to the installation of reinforcing steel.

1.4 QUALIFICATIONS

Welders shall be qualified in accordance with AWS D1.4. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4.

1.5 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M grades and sizes as indicated. In highly-corrosive environments, or when directed by the Contracting Officer, reinforcing steel shall conform to ASTM A 775/A 775M. Reinforcement steel shall be epoxy-coated as noted on the Contract Drawings.

2.2 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.3 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports

shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall 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 one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

-- End of Section --

SECTION 03301A

CAST-IN-PLACE STRUCTURAL CONCRETE

Item Number 28: Concrete

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein for cast-in-place concrete structures, including the bulkhead cap, headwalls, wingwalls and junction chambers. The Contractor shall maintain strict compliance to the requirements of this specification.

1.2 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 117/117R	(1990) Standard Tolerances for Concrete Construction and Materials & Commentary
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 211.2	(1991) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 214R	(2002) Evaluation of Strength Test Results of Concrete
ACI 301	(1996) Standard Specifications for Structural Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 318/318R	(2002) Metric Building Code Requirements for Reinforced Concrete and Commentary

AMERICAN CONCRETE INSTITUTE

(2003) Field Guide to Concrete Repair Application Procedures (RAP)

RAP-1 Structural Crack Repair By Epoxy Injection

RAP-2 Crack Repair By Gravity Feed With Resin

RAP-3 Spall Repair By Low-Pressure Sparying

RAP-4 Surface Repair Using Form-and-Pour Techniques

RAP-5 Surface Repair Using Form-and-Pump Techniques

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991) Burlap Cloth Made From Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31	(2003a) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Concrete Aggregates
ASTM C 39	(2003) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	(2003) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 78	(1994) Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
ASTM C 94	(1996) Ready-Mixed Concrete
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143	(2003) Slump of Hydraulic Cement Concrete
ASTM C 150	(2002ael) Portland Cement
ASTM C 171	(2003) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173	(1994a) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192	(2002) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 330	(1989) Lightweight Aggregates for Structural Concrete
ASTM C 494	(1999ael) Chemical Admixtures for Concrete
ASTM C 496	(1990) Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C 552	(1991) Cellular Glass Thermal Insulation
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 591	(1994) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 595	(2003) Blended Hydraulic Cements
ASTM C 618	(2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 685	(1995) Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C 881	(2002) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 937	(1980; R 1991) Grout Fluidifier for Preplaced-Aggregate Concrete
ASTM C 940	(1989) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM C 989	(1999) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1017	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059	(1999) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064	(2003l) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(2003) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM C 1107	(2002) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1116	(1991) Fiber-Reinforced Concrete and Shotcrete
ASTM C 1240	(2003a) Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar and Mortar
ASTM D 75	(2003) Sampling Aggregates
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 E 96	(1995) Water Vapor Transmission of Materials
ASTM E 1155	(1996) Determining Floor Flatness and Levelness Using the F-Number System

CORPS OF ENGINEERS (COE)

COE CRD-C 94	(1995) Surface Retarders
COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 540	(1971; R 1981) Standard Specification for Nonbituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavements, Sawable Type
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstop
EM 1110-2-2002	(1995) Evaluation and Repair of Concrete Structures

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1995) NIST Handbook 44: Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA TMMB-01	(1992) Truck Mixer Agitator and Front Discharge Concrete Carrier Standards of the Truck Mixer Manufacturers Bureau
NRMCA CPMB 100	(1990) Concrete Plant Standards
NRMCA QC 3	(1984) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

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 Test Reports

Mixture Proportions; G, RO

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. 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.

Testing and Inspection for Contractor Quality Control; G, RO

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, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

SD-07 Certificates

Qualifications; G, RO

Written documentation for Contractor Quality Control personnel.

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 GENERAL REQUIREMENTS

1.5.1 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. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.5.2 Strength Requirements and w/c Ratio

1.5.2.1 Strength Requirements

Specified compressive strength (f'c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
4000 psi at 28 days	All structures or parts thereof

Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C 39. Flexural strength shall be determined in accordance with ASTM C 78.

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 and repair the holes. Cores will be tested by the Government.

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 understrength 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.

d. Evaluation of Concrete Flexural Strength. Flexural strength specimens (beams) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 78. 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 flexural strength and no individual test result falls below the specified flexural strength by more than 50 psi. A "test" is defined as the average of two companion beams. 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 slab is considered potentially deficient.

1.5.2.2 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
0.45	All structures or parts thereof

These w/c's may cause higher strengths than that required above for compressive or flexural 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, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and 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.

1.5.3 Air Entrainment

Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent.

1.5.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143.

Structural Element	Slump Minimum	Slump Maximum
Walls, columns and beams	2 in.	4 in.
Foundation walls, substructure walls, footings, slabs	1 in.	3 in.
Any structural concrete approved for placement by pumping:		
At pump	2 in.	6 in.
At discharge of line	1 in.	4 in.

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 of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

1.5.5 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.

1.5.6 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.

1.5.7 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.

1.5.8 Cement Content

The Contractor shall limit the cement content to a maximum of 600 pounds per cubic yard. If higher cement content is required, the Contractor shall seek approval of the Contracting Officer.

1.6 MIXTURE PROPORTIONS

Concrete shall be composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.6.1 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. Except as specified for flexural strength concrete, 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, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and 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.

1.6.2 Proportioning Studies for Flexural Strength Concrete

Trial design batches, mixture proportioning studies, and testing requirements shall conform to the requirements specified in paragraph Proportioning Studies for Normal Weight Concrete, except that proportions shall be based on flexural strength as determined by test specimens (beams) fabricated in accordance with ASTM C 192 and tested in accordance with ASTM C 78. Procedures given in ACI 211.1 shall be modified as necessary to accommodate flexural strength.

1.6.3 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.

1.6.3.1 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:

$f'cr = f'c + 1.34S$, 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

1.6.3.2 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:

a. If the specified compressive strength f'c is less than 3,000 psi,

   f'cr = f'c + 1000 psi

b. If the specified compressive strength f'c is 3,000 to 5,000 psi,

   f'cr = f'c + 1,200 psi

c. If the specified compressive strength f'c is over 5,000 psi,

   f'cr = f'c + 1,400 psi

1.6.4 Average Flexural Strength Required for Mixtures

The mixture proportions selected during mixture design studies for flexural strength mixtures and the mixture used during concrete production shall be designed and adjusted during concrete production as approved, except that the overdesign for average flexural strength shall simply be 15 percent greater than the specified flexural strength at all times.

1.7 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.

1.8 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.

1.8.1 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.

1.8.2 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.

1.8.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.8.4 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 portland cement, portland-pozzolan cement, portland blast-furnace slag cement, or portland cement in combination with pozzolan or ground granulated blast furnace slag or silica fume and shall conform to 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

ASTM C 150, Type V.

2.1.2 Pozzolan (Fly Ash)

ASTM C 618, Class C or 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, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

2.1.3 Ground Granulated Blast-Furnace (GGBF) Slag

ASTM C 989, Grade 120.

2.1.4 Silica Fume

Silica fume shall conform to ASTM C 1240. Available alkalies shall conform to the optimal limit given in Table 2 of ASTM C 1240. Silica fume may be furnished as a dry, densified material or as a slurry. In accordance with paragraph Technical Service for Specialized Concrete, the Contractor shall provide at no cost to the Government the services of a manufacturer's technical representative experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume.

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 57.

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 and flexural 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 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 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, 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.

2.10 JOINT MATERIALS

2.10.1 Joint Fillers, Sealers, and Waterstops

Expansion joint fillers shall be preformed materials conforming to ASTM D 1751 or ASTM D 1752. Materials for waterstops shall be in accordance with Section 03150A EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS. Materials for and sealing of joints shall conform to the requirements of Section 07920 JOINT SEALANTS.

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 03100A STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03200A 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 (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 foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.1.2 Preparation of Rock

Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as specified below for Previously Placed Concrete. Rock surfaces shall be kept continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Concrete shall be placed before the mortar stiffens.

3.1.1.3 Excavated Surfaces in Lieu of Forms

Concrete for footings and walls may be placed directly against the soil provided the earth or rock has been carefully trimmed, is uniform and stable, and meets the compaction requirements of Section 02222 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. 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

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Concrete at the side of vertical construction joints shall be prepared as approved by the Contracting Officer. 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.

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 feet 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 either be batched and mixed onsite or 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. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall conform to the following subparagraphs.

3.3 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers.

3.4 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from mixer or 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 yards shall 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 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.4.3 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.

3.4.4 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.

3.4.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means, such as discharge baffle or hopper , for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.4.6 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 85 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. 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, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Sufficient placing capacity shall be provided so that concrete can be kept free of cold joints.

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, except for slabs 4 inches thick or less. 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. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation or flotation of coarse aggregate shall be prevented. 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 50 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 Underwater

Concrete shall be deposited in water by a tremie or concrete pump. The methods and equipment used shall be subject to approval. Concrete buckets shall not be used for underwater placement of concrete except to deliver concrete to the tremie. The tremie shall be watertight and sufficiently large to permit a free flow of concrete. The concrete shall be deposited so that it enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete. The discharge end of the pump line or tremie shaft shall be kept continuously submerged in the concrete. The underwater seal at start of placing shall not produce undue turbulence in the water. The tremie shaft shall be kept full of concrete to a point well above the water surface. Placement shall proceed without interruption until the concrete has been brought to the required height. The tremie shall not be moved horizontally during a placing operation, and a sufficient number of tremies shall be

provided so that the maximum horizontal flow of concrete will be limited to 15 feet. Concrete shall not be deposited in running water or in water with a temperature below 35 degrees F.

3.5.7 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, waterstops 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.

3.5.8 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. 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 or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. In general, such joints shall be located near the middle of the spans of supported slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs, 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, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. Except where otherwise indicated, construction joints between interior slabs on grade and vertical surfaces shall consist of 30 pound asphalt-saturated felt, extending for the full depth of the slab. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable inserts, or 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 07920 JOINT SEALANTS.

3.6.1 Contraction Joints

For concrete other than slabs on grade, contraction joints shall be located so that the unit of operation does not exceed 15 feet. 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. Contraction 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 contraction joint shall be subject to approval of the Contracting Officer.

3.6.2 Waterstops

Waterstops shall be installed in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03150A EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

3.6.3 Dowels and Tie Bars

Dowels and tie bars shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03200A CONCRETE REINFORCEMENT and herein. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.7 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03100A STRUCTURAL CONCRETE FORMWORK. 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 A or 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 A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.7.1 Class A Finish and Class B Finish

Class B finish is required in the following areas: exposed faces of concrete cap, retaining walls, and headwalls. 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 03100A STRUCTURAL CONCRETE FORMWORK, 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 C and Class D Finish

Class C finish is required in the following areas: interior surfaces of hydraulic chambers. Class D finish is required in the following areas: faces of walls and chambers, and pipe saddles facing earth fill. Fins, ravelings, and loose material shall be removed, and, except as otherwise indicated or as specified in Section 03100A 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 and, for Class C and D finishes, more than 2 inches 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.

3.9 CURING AND PROTECTION

3.9.1 General

Concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
All other concrete	7 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 as otherwise permitted by paragraph Membrane Forming Curing Compounds, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.9.2 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.

3.9.3 Membrane Forming Curing Compounds

Membrane forming curing compounds shall be used only on surfaces in the areas not exposed to the viewing public. 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. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements, may be used for surfaces which 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. 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.

3.9.4 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 for the first seven days after placing. 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 of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Government, 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.

3.10 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 onsite 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 at least once per month thereafter for conformance with ASTM C 1077.

3.10.1 Grading and Corrective Action

3.10.1.1 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.

3.10.1.2 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.

3.10.2 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. 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.

3.10.3 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.

3.10.4 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.

3.10.5 Concrete Mixture

a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete and ASTM C 173 for lightweight 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 aircontent 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. In addition to slump tests which shall be made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143 for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. 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. 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 or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 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.

3.10.6 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.

3.10.7 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.

3.10.8 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.

3.10.9 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.

3.10.10 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.

3.10.11 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.

3.10.12 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 03425

PRECAST CONCRETE

Item No. 28A: Precast Concrete

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein.

1.2 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 201.2R	(2001) Guide to Durable Concrete
ACI 211.1	(1991; R 1997) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214	(2002) Evaluation of Strength Test Results of Concrete
ACI 318/318R	(2002) Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM)

ASTM C 31	(2003) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Concrete Aggregates
ASTM C 39	(2003) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 150	(2003) Portland Cement
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete By The Pressure Method
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 311	(2002) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete

ASTM C 430	(2003) Standard Test Method for Fineness of Hydraulic Cement by the 45-µm (#325) Sieve
ASTM C 494	(2004) Chemical Admixtures for Concrete
ASTM C 595	(2003) Blended Hydraulic Cements
ASTM C 617	(2003) Capping Cylindrical Concrete Specimens
ASTM C 618	(2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture In Portland Cement Concrete
ASTM C 1069	(1986; R 1997) Specific Surface Area of Alumina or Quartz by Nitrogen Adsorption

PRECAST PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI Mnl-116	(1999) Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
PCI Mnl-120	(1999) PCI Design Handbook - Precast and Prestressed Concrete

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements

1.3.1.1 Precast-Prestressed Members and Connections

Design of members and connections shall be in accordance with ACI 318/318R and PCI Mnl-120.

1.3.2 Performance Requirements

Perform the following testing to ensure the materials and method used meet the requirements of these specifications and will produce precast-prestressed concrete members which are suitable for their intended use.

1.3.2.1 Concrete

Concrete shall be sampled and cylinders made in accordance with ASTM C 172 and ASTM C 31.

a. Concrete Test Cylinders. A minimum of two concrete test cylinders per bed shall be made to verify the strength of concrete at the time of stress transfer and a minimum of two test cylinders per day or 50 cubic yards of concrete or fraction thereof, whichever results in the most cylinders, shall be made for each mix design to verify the attainment of the specified strength.

b. Cylinder Making. Cylinders shall be made as near as possible to the location where they will be cured and shall not be disturbed in any way from 1/2 hour after casting until they are either 24 hours old or ready to be tested. Concrete in cylinders may be consolidated by rodding or by vibration as specified in ASTM C 31.

c. Cylinder Curing

(1) Test cylinders shall be cured with similar methods as the members they represent. In lieu of actual curing with the members, cylinders may be cured in curing chambers correlated in temperature and humidity with the beds. In such a case, the correlation shall be constantly verified by use of recording thermometers in the curing chambers and comparison with the temperature records of beds and by use of the same methods of moisture retention for curing chambers and casting beds.

(2) For beds cured by steam or radiant heat, cylinders shall be placed at random points along the bed. If there is any indication of variable heat, cylinders shall be placed in the coolest area.

(3) Test cylinders to indicate compliance with specified 28-day or earlier strength shall remain in the bed with the member until the member is removed. At that time, the cylinders shall be removed from their molds and placed in storage in a moist condition at 73.4 degrees plus or minus 3 degrees F.

d. Testing of Cylinders

(1) Testing of cylinders to determine compressive strength shall be performed in accordance with ASTM C 39. The strength of concrete at any given age shall be determined as the average of two cylinders, except a single cylinder test can be used to determine stress transfer strength or predictive strengths at less than 28 days.

(2) Testing machines shall be calibrated in accordance with ASTM C 39.

1.3.2.2 Air Content

The air content tests shall be conducted in accordance with ASTM C 231. At least one air content test shall be conducted on the concrete from which each member is cast.

1.4 SUBMITTALS

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

SD-02 Shop Drawings

Erection; G, RO

The Contractor shall prepare and submit for approval complete shop drawings that show the precast unit manufacturer's recommended details and materials for the work required by paragraphs DELIVERY, STORAGE, AND HANDLING and ERECTION. The shop drawings shall include: design computations; marking of the units for the placing drawings; anchorages for work of other trades; anchorages to support construction; size and location of steel tendons; methods of stressing; location and sizes of all openings

12 in. wide or larger to be cast into members; formwork; joints between units and other construction; reinforcing steel details; method of curing; and, pickup points and lifting devices.

Erection Plan; G, RO

The Contractor shall prepare a detailed erection plan which shall be submitted at least 15 days prior to the date that erection of members is to begin.

SD-03 Product Data

Concrete Mixture Proportions; G, RO

Concrete mixture proportions shall be submitted for approval.

SD-06 Test Reports

Materials

Certified test reports of required material tests shall be submitted prior to the use of the materials in the work. Reports shall be furnished for each shipment and shall be identified with specific lots.

Concrete

The results of concrete strength testing by the contractor shall be submitted not more than 5 days after the tests are completed.

SD-07 Certificates

Cement; Pozzolan; Air-Entraining Admixture; Water-Reducing Admixture; Accelerating Admixture; Aggregates;

Cement, Pozzolan, Air-Entraining Admixture, Water-Reducing Admixture, Accelerating Admixture, and Aggregates shall be certified for compliance with all specifications requirements.

Air Content

Each precast member delivered to the jobsite shall be accompanied by a certificate certifying that the air content in the concrete in that member is in compliance with the specifications. The certification must be based on an air content test conducted in conformance with ASTM C 231 on at least one of the batches of concrete from which the member was cast.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Transportation

1.5.1.1 Transporting Members

In transporting members by truck, railroad car, or barge, provision shall be made for supporting the members as described above, except battens can be continuous over more than one stack of units, with adequate bracing to ensure their maintaining the vertical position and damping of dangerous vibrations. Trucks with double bolsters are satisfactory provided the

members are fully seated on the outer bolsters at not more than 3 feet or the depth of the member from the end and the inner bolster is not more than 8 feet from the end of the member or the designated pickup point. Adequate padding material shall be provided between tie chains or cables to preclude chipping of concrete.

1.5.1.2 Lateral Deflection or Vibration

Any noticeable indication of lateral deflection or vibration during transportation shall be corrected by rigid bracing between members or by means of lateral trussing.

1.5.2 Storage

1.5.2.1 Storage Areas

Storage areas for prestressed members shall be stabilized, and suitable foundations shall be provided, so differential settlement or twisting of members will not occur.

1.5.2.2 Stacked members

Stacked members shall be separated and supported by battens placed across the full width of each bearing point. Battens shall be arranged in vertical planes at a distance not greater than the depth of the member from designated pickup points. Battens shall not be continuous over more than one stack of precast units. Stacking of members shall be such that lifting devices will be accessible and undamaged. The upper members of a stacked tier shall not be used as storage areas for shorter members or equipment.

1.5.3 Handling of Members

The location of pickup points for handling of the members and details of the pickup devices shall be shown in shop drawings. Members shall be handled only by means of approved devices at designated locations. Members shall be maintained in an upright position at all times and picked up and supported as shown in approved shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall comply with the following:

2.1.1 Cement

Cement shall comply with the following:

2.1.1.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type V.

2.1.2 Other Materials

2.1.2.1 Aggregates

Aggregates shall meet the requirements of ASTM C 33.

2.1.2.2 Admixtures

In no event shall admixtures containing chlorides or nitrates be used in the concrete.

a. Air-entraining admixture shall be certified to comply with ASTM C 260.

b. Water-reducing admixture shall be certified to comply with ASTM C 494 Type A.

c. Accelerating admixture shall be certified to comply with ASTM C 494 Type C.

2.1.3 Steel Reinforcement

Steel reinforcement shall be in accordance with Section 03200 CONCRETE REINFORCEMENT.

2.2 CONCRETE MIXTURE PROPORTIONS

2.2.1 Concrete

Concrete shall be composed of cementitious material, water, fine and coarse aggregate, and admixtures. The cementitious material shall be portland or blended hydraulic cement and pozzolan where appropriate. The admixtures shall be an air-entraining agent and may include a water-reducing admixture when its formulation and use are approved.

2.2.2 Proportions

The concrete mixture proportions shall meet the following requirements:

Maximum Water-cement ratio (w/c) = 0.40.
Specified Strength = 5000 psi at 28 days.

Air Content = 5 to 7 percent as determined in accordance with ASTM C 231. Proportions shall be selected so that the maximum permitted w/c ratio is not exceeded and so as to produce an average strength exceeding the design strength f'c by the amount indicated below. Where the production facility has a standard deviation record determined in accordance with ACI 214, based on 30 consecutive strength tests of similar mixture proportions to that proposed, obtained within 1 year of the time when concrete placing is expected, it shall be used in selecting average strength. The average strength used as the basis for selecting proportions shall exceed the specified strength f'c by at least.

400 psi if standard deviation is less than 300 psi
550 psi if standard deviation is 300 to 400 psi
700 psi if standard deviation is 400 to 500 psi
900 psi if standard deviation is 500 to 600 psi

If the standard deviation exceeds 600 psi or if a standard deviation record is not available, proportions shall be selected to produce an average strength at least 1,200 psi greater than the specified strength.

Mixtures shall be proportioned in accordance with ACI 211.1. The trial mixtures shall be formulated using the same materials as those to be used in the units supplied under this specification, and the selected

proportions shall be submitted for approval with the results of cylinder strengths at 28 days.

2.3 EVALUATION AND ACCEPTANCE

2.3.1 Concrete

A test result shall be the average of the strengths of the two test cylinders made in accordance with paragraph SYSTEM DESCRIPTION, subparagraph PERFORMANCE REQUIREMENTS, subparagraph CONCRETE, subparagraph "a", CONCRETE TEST CYLINDERS. The strength level of the concrete will be considered satisfactory if the average of all sets of three consecutive strength tests equal or exceed the specified strength f'(c) and no individual test falls below the specified value by more than 500 pounds per square inch. Members manufactured with concrete that does not meet the strength requirements shall be rejected.

2.3.1.1 Air Content

All members cast with concrete having a measured air content less than 5 percent shall be rejected. Members cast with concrete having an air content up to 9 percent may be incorporated into the work if the strength requirements are met.

2.3.2 Tolerances

The precast-prestressed members shall be manufactured within the following tolerances. Members failing to meet the dimensional tolerances shall be rejected.

2.3.2.1 Length of Member

The length of the member shall not deviate from the length shown in the contract drawings by more than plus or minus 3/4 inch or plus or minus 1/8 inch per 10 feet of length, whichever is greater.

2.3.2.2 Cross-sectional Dimensions

The cross-sectional dimensions of a member, if less than 36 inches, shall not vary by more than plus or minus 1/4 inch and, if over 36 inches, they shall not vary by more than plus or minus 3/8 inch.

2.3.2.3 Horizontal Alignment (Sweep)

The horizontal alignment of the members shall not deviate from a straight line parallel to the theoretical centerline by more than 1/2 or 1/8 inch per 10 feet of length, whichever is greater. The maximum gap between two adjacent members due to sweep shall not exceed 1 inch.

2.3.2.4 Handling Devices

The actual position of handling devices shall not deviate from the designed position by more than plus or minus 6 inches.

2.3.2.5 Squareness of Ends

The ends of members shall not deviate from being square by more than plus or minus 1/4 inch. Squareness shall be checked in both the vertical and horizontal planes.

2.3.3 Defects

2.3.3.1 Minor Defects

Minor defects are those which involve less than 36 square inches of concrete and do not expose stressing tendons or reinforcing steel. These defects will be repaired as specified hereinafter. Cracks which are visible but are 0.01 inch wide or less will be accepted.

2.3.3.2 Major Defects

Major defects are those which involve more than 36 square inches of concrete or expose stressing tendons or reinforcing steel. If one or more major defects appear in a member, it shall be rejected. Cracks of a width of more than 0.01 inch shall be cause for rejection of the member.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication of precast-prestressed members shall follow the applicable provisions of the PCI Mnl-116, except as specified herein.

3.2 BEDS AND FORMS

3.2.1 Casting Beds

All casting beds shall have concrete support on unyielding foundations.

3.2.2 Forms

Forms, both fixed and movable, shall be of steel. All forms and beds shall be thoroughly cleaned after each use.

3.2.3 Bulkheads

Bulkheads, spacers, templates, and similar equipment having influence on the accuracy of dimensions and alignment shall be regularly inspected and maintained after each casting.

3.2.4 Alignment

Accurate alignment of forms shall be maintained during the casting operation to assure compliances with tolerances specified in paragraph EVALUATION AND ACCEPTANCE. Leakage of the paste in form joints is not acceptable, and measures shall be taken to prevent such leakage. Measures shall also be taken to provide corner chamfers.

3.3 STEEL REINFORCEMENT

Steel bars and welded wire fabric shall be placed in accordance with Section 03200A CONCRETE REINFORCEMENT.

3.4 CONCRETE PLACEMENT

Concrete placement shall be in accordance with Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE, except that once placement is started in a member it shall be carried on in a continuous operation until the member is completed. Members shall be cast in a horizontal position and casting in

tiers will not be permitted. Adequate vibration shall be provided with internal and form vibrators so the cast members shall be free of rock pockets or surface blemishes resulting from inadequate vibration. Cold joints shall not be permitted in prestressed concrete members. If delays occur that result in hardening of the concrete so it will not receive a vibrator and again become plastic, the concrete shall be removed and the forms shall be washed out and refilled, otherwise partially cast members will be rejected.

3.5 CURING AND PROTECTION

Concrete for the manufacturing of the precast-prestressed concrete members shall be cured and protected in accordance with Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE or by other methods further specified here.

3.5.1 Curing with Steam at Atmospheric Pressure

Steam curing shall be under a suitable enclosure to retain the live steam to minimize moisture and heat losses. The enclosure shall allow free circulation of the steam around the sides and top of the beams. Steam jets shall be so positioned so they do not discharge directly on the concrete, forms, or test cylinders. The cycle of steam application shall conform to the following:

3.5.1.1 Curing After Placing and Vibrating

After placing and vibrating, the concrete shall be allowed to attain its initial set before the steam is applied. During the period between placement of the concrete and application of steam, provisions shall be made to prevent surface drying by means of a coating of membrane curing compound, moist covers, or equally effective methods. Application of the steam shall be delayed not less than 2 hours and not more than 10 hours after the time of concrete placement. If the ambient temperature is below 50 degrees F, enough heat shall be applied to maintain the concrete at its placing temperature.

3.5.1.2 Temperature Increase

The ambient temperature within the casting enclosure shall be increased at a rate not to exceed 40 degrees F per hour. Temperature increase shall be as uniform as possible.

3.5.1.3 Temperature Range

The temperature shall be increased until the ambient temperature in the casting enclosure is between 140 and 160 degrees F. Once this temperature range is reached, it shall be maintained until the concrete has reached the compressive strength necessary for stressing or destressing the tendons.

3.5.1.4 Temperature Decrease

In discontinuing the steam curing, the ambient air temperature shall decrease at a rate not to exceed 40 degrees F per hour. Temperature decrease shall be as uniform as possible.

3.5.1.5 Recording Thermometers

Recording thermometers showing the time-temperature relationship through

the curing period from placing concrete to transfer of prestress shall be provided. At least one recording thermometer per casting enclosure shall be used. The desired curing time-temperature relationship shall be placed on the recording chart of the recording thermometer to aid the personnel controlling the temperature during curing. Recording charts shall be made available upon request and shall be clearly visible during the curing process.

3.5.2 Curing with Radiant Heat and Moisture

3.5.2.1 Radiant Heat

Radiant heat may be applied to beds by means of pipe circulating steam, hot oil, or hot water or by electric blankets or heating elements on forms. Pipes, blankets, or elements shall not be in contact with concrete, form surface, or test cylinders.

3.5.2.2 Moisture Loss

During the cycle of radiant heat curing, effective means shall be provided to prevent rapid loss of moisture in any part of the member. Moisture may be applied by a covering of moist burlap or cotton matting. Moisture may be retained by covering the member with a plastic sheet in combination with an insulating cover or by applying a liquid seal coat or membrane curing compound.

3.5.2.3 Temperature Limits

Temperature limits and use of recording thermometer shall be as specified for curing with steam at atmospheric pressure.

3.5.2.4 Termination of Curing

Termination of curing shall be as specified in Section 03301A CAST-IN-PLACE STRUCTURAL CONCRETE unless the concrete has been cured by one of the two methods stated above. Termination of curing for concrete cured by either the steam at atmospheric pressure method or the radiant heat with moisture shall be determined based on the compressive strength of the concrete necessary for stressing or destressing the tendons.

3.6 REPAIRS

All honeycombed areas, chipped corners, air pockets over 1/4 inch in diameter, and other minor defects shall be repaired. Form offsets of fins over 1/8 inch shall be ground smooth. All unsound concrete shall be removed from defective areas prior to repairing. All surfaces permanently exposed to view shall be repaired by a blend of portland cement and white cement properly proportioned so that the final color when cured will be the same as adjacent concrete.

3.7 FINISHING

3.7.1 Unformed surfaces

Unformed surfaces shall receive a wood float finish.

3.8 ERECTION

Erection shall comply with the following.

3.8.1 Storage Provisions

All provisions for storage and handling given in paragraph DELIVERY, STORAGE, AND HANDLING shall be observed at the erection site.

3.8.2 Erection Plan

The erection plan shall be in sufficient detail so that adequacy of equipment, techniques, and accessories can be determined and comments offered. Acceptance of the Contractor's erection plan shall not relieve the Contractor of his responsibility for erecting precast prestressed members into position as required by the plans and specifications.

-- End of Section --

SECTION 04200

MASONRY

Item No. 16: Concrete Masonry Construction

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 SP-66	(1994) ACI Detailing Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 90	(2003) Loadbearing Concrete Masonry Units
ASTM C 91	(2003a) Masonry Cement
ASTM C 270	(2003) Mortar for Unit Masonry
ASTM E 447	(1997) Compressive Strength of Masonry Prisms

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals; G, RO

The plan shall include 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, protection of property which is to remain undisturbed, and coordination with other work in progress. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1.

SD-03 Product Data

Cold Weather Installation; G, RO

Cold weather construction procedures.

SD-06 Test Reports

Masonry Cement; G, RO

Test reports from an approved independent laboratory. Test reports on a previously tested material shall be certified as the same as that proposed for use in this project.

SD-07 Certificates

Concrete Brick;Concrete Masonry Units (CMU);
Mortar Admixtures;Grout Admixtures;

Certificates of compliance stating that the materials meet the specified requirements.

1.3 PROTECTION

1.3.1 Protection of Personnel

During the work the Contractor shall continuously evaluate the condition of the structure and take immediate action to protect all personnel. No area, section, or component of floors, roofs, walls, columns, pillasters, or other structural elements will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure. Floors, roofs, walls, columns, pillasters, or other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, may be allowed to remain standing without additional bracing, shoring, or lateral support. 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.

1.3.2 Protection of Existing Property

Before beginning the 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 owner; 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.

1.3.3 Protection from the Weather

The interior of buildings to remain, and salvageable materials and equipment shall be protected from the weather at all times.

1.4 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.4.1 Masonry Units

Concrete masonry units shall be covered or protected from inclement weather. In addition, glass block units and prefaced concrete units shall be stored with their finish surfaces covered. Prefabricated lintels shall be marked on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.4.2 Reinforcement, Anchors, and Ties

Steel reinforcing bars, coated anchors, ties, and joint reinforcement shall be stored above the ground. Steel reinforcing bars and uncoated ties shall be free of loose mill scale and rust.

1.4.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Sand and aggregates shall be stored in a manner to prevent contamination or segregation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval.

2.2 CONCRETE MASONRY UNITS (CMU)

Hollow and solid concrete masonry units shall conform to ASTM C 90. Cement shall have a low alkali content and be of one brand.

2.2.1 Aggregates

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirements when tested for stain-producing iron compounds in accordance with ASTM C 641: by visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

2.2.2 Kinds and Shapes

Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work as indicated. In exposed interior masonry surfaces, units having a bullnose shall be used for vertical external corners except at door, window, and louver jambs. Radius of the bullnose shall be 1 inch. Units used in exposed masonry surfaces in any one building shall have a uniform fine to medium texture and a uniform color.

2.3 MORTAR

Mortar shall be Type [S] [N] in accordance with the proportion specification of ASTM C 270 except Type S cement-lime mortar proportions shall be 1 part cement, 1/2 part lime and 4-1/2 parts aggregate; Type N cement-lime mortar proportions shall be 1 part cement, 1 part lime and 6 parts aggregate; when masonry cement ASTM C 91 is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Verification of masonry cement performance shall be based on ASTM C 780 and ASTM C 1072. Mortar for prefaced concrete masonry unit wainscots shall contain aggregates with 100 percent passing the No. 8 sieve and 95 percent passing the No. 16 sieve. Pointing mortar in showers and kitchens shall contain ammonium stearate, or aluminum tri-stearate, or calcium stearate in an amount equal to 3 percent by weight of cement used. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.3.1 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C.

2.4 GROUT

Grout shall conform to ASTM C 476. Cement used in grout shall have a low alkali content. Grout slump shall be between 8 and 10 inches. Grout shall be used subject to the limitations of Table III. Proportions shall not be changed and materials with different physical or chemical characteristics shall not be used in grout for the work unless additional evidence is furnished that the grout meets the specified requirements.

2.4.1 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C.

2.4.2 Grout Barriers

Grout barriers for vertical cores shall consist of fine mesh wire, fiberglass, or expanded metal.

2.5 ANCHORS, TIES, AND BAR POSITIONERS

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153/A 153M, Class B-2. Steel wire used for anchors and ties shall be fabricated from steel wire conforming to ASTM A 82. Anchors and ties shall be sized to provide a minimum of 5/8 inch mortar cover from either face.

PART 3 EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

3.1.1 Hot Weather Installation

The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent. All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 4 feet ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

3.1.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F, a written statement of proposed cold weather construction procedures shall be submitted for approval. The following precautions shall be taken during all cold weather erection.

3.1.2.1 Preparation

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

a. Air Temperature 40 to 32 Degrees F. Sand or mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F.

b. Air Temperature 32 to 25 Degrees F. Sand and mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing.

c. Air Temperature 25 to 20 Degrees F. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 mph.

d. Air Temperature 20 Degrees F and below. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Enclosure and auxiliary heat shall be provided to maintain air temperature above 32 degrees F. Temperature of units when laid shall not be less than 20 degrees F.

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 40 to 32 degrees F. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 32 to 25 degrees F. Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature 25 to 20 degrees F. Masonry shall be

completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature 20 degrees F and Below. Masonry temperature shall be maintained above 32 degrees F for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.2 LAYING MASONRY UNITS

Masonry units shall be laid in running bond pattern. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below. In double wythe construction, the inner wythe may be brought up not more than 16 inches ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches.

3.2.1 Surface Preparation

Surfaces upon which masonry is placed shall be cleaned of laitance, dust, dirt, oil, organic matter, or other foreign materials and shall be slightly roughened to provide a surface texture with a depth of at least 1/8 inch. Sandblasting shall be used, if necessary, to remove laitance from pores and to expose the aggregate.

3.2.2 Forms and Shores

Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.3 Concrete Masonry Units

Units in piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout shall be full bedded in mortar under both face shells and webs. Other units shall be full bedded under both face shells. Head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell. Foundation walls below grade shall be grouted solid. Jamb units shall be of the shapes and sizes

to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved. Double walls shall be stiffened at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of the double wall. Walls and partitions shall be adequately reinforced for support of wall-hung plumbing fixtures when chair carriers are not specified.

3.2.4 Tolerances

Masonry shall be laid plumb, true to line, with courses level. Bond pattern shall be kept plumb throughout. Corners shall be square unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TABLE II

TOLERANCES

Variation from the plumb in the lines and surfaces of columns, walls and arises	
In adjacent masonry units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variation from level for bed joints and top surfaces of bearing walls	
In 10 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from horizontal lines	
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch

TOLERANCES

Variations in cross sectional dimensions of columns and in thickness of walls

Minus	1/4 inch
Plus	1/2 inch

3.2.5 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.6 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.6.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparged masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

3.2.6.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.7 Joint Widths

Joint widths shall be as follows:

3.2.7.1 Concrete Masonry Units

Concrete masonry units shall have 3/8 inch joints, except for prefaced concrete masonry units.

3.2.8 Unfinished Work

Unfinished work shall be stepped back for joining with new work. Toothing may be resorted to only when specifically approved. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.2.9 Masonry Wall Intersections

Each course shall be masonry bonded at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement and prefabricated corner or tee pieces of joint reinforcement as shown.

3.3 MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within 2-1/2 hours after mixing shall be discarded.

3.4 ANCHORAGE TO CONCRETE AND STRUCTURAL STEEL

3.4.1 Anchorage to Concrete

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.5 PARGING

The outside face of below-grade exterior concrete-masonry unit walls enclosing usable rooms and spaces, except crawl spaces, shall be parged with type S mortar. Parging shall not be less than 1/2 inch thick troweled to a smooth dense surface so as to provide a continuous unbroken shield from top of footings to a line 6 inches below adjacent finish grade, unless otherwise indicated. Parging shall be coved at junction of wall and footing. Parging shall be damp-cured for 48 hours or more before backfilling. Parging shall be protected from freezing temperatures until hardened.

3.6 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean,

free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.6.1 Prefaced Concrete Masonry Unit Surfaces

Prefaced concrete masonry unit surfaces shall be cleaned with soap powder and clean water applied with stiff fiber brushes. Excess mortar shall be removed with wood paddles. Metal cleaning tools, metal brushes, abrasive powders, and acid solutions shall not be used. At the completion of cleaning operations, the surfaces shall be rinsed with clean water. In areas of traffic within the building, a barricade of wood supported by framing lumber shall be erected to protect the units. In other areas, a heavy kraft-type building paper shall be taped over the units until final acceptance.

-- End of Section --

SECTION 05055A

METALWORK FABRICATION, MACHINE WORK, AND MISCELLANEOUS PROVISIONS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein including bulkhead fabrications and connections and interpretive signs. This Section is included to supplement the fabrication and installation of the various steel and other metal items required. Work described herein shall be considered incidental to work described elsewhere in the Contract.

1.2 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 30	(1986) Aluminum Structures, Construction Manual Series Section 1

ASME INTERNATIONAL (ASME)

ASME B4.1	(1967; R 1999) Preferred Limits and Fits for Cylindrical Parts

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 193/A 193M	(2003) Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 325	(2002) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(2003) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 514/A 514M	(2000; Rev A) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM E 94	(2000) Radiographic Testing
ASTM E 165	(2002) Liquid Penetrant Examination Inspection Method

ASTM E 446	(1998) Radiographs for Steel Casting up to 2 in. (51 mm) in Thickness
ASTM E 709	(2001) Magnetic Particle Examination

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel
AWS D1.2	(2003) Structural Welding Code Aluminum

1.3 SUBMITTALS

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

SD-04 Drawings

Detail Drawings; G, DO

Detail drawings for metalwork and machine work shall be submitted and approved prior to fabrication.

SD-07 Schedules

Materials Orders

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

Materials list for fabricated items shall be submitted at the time of submittal of detail drawings.

Shipping Bill

Shipping bill shall be submitted with the delivery of finished pieces to the site.

SD-08 Statements

Welding Procedures for Structural Steel; G, RO

Schedules of welding procedures for steel structures shall be submitted and approved prior to commencing fabrication.

Welding Procedures for Aluminum; G, RO

Schedules of welding procedures for aluminum structures shall be submitted and approved prior to commencing fabrication.

SD-09 Reports

Tests, Inspections, and Verifications

Certified test reports for materials shall be submitted with all materials delivered to the site.

SD-13 Certificates

Qualification of Welders and Welding Operators

Certifications for welders and welding operators shall be submitted prior to commencing fabrication.

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 5 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.

2.2.1.3 Structural Aluminum Fabrication

Laying out and cutting of aluminum shall be in accordance with the AA 30, Section 6.

2.2.2 Welding

2.2.2.1 Welding of Structural Steel

a. 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.

2.2.2.2 Welding of Aluminum

Welding Procedures for Aluminum shall be prequalified as described in AWS D1.2.

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

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.

2.2.4 Rivets

Drive rivets shall conform to the requirements of ASTM A 193/A 193M.

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 Inspection of Structural 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 for steel and AWS D1.2 for aluminum, 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.

2.3.2.1 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 for steel and AWS D1.2 for aluminum.

2.3.2.2 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 for steel and AWS D1.2 for aluminum or possess any degree of incomplete fusion, inadequate penetration or undercutting.

d. Welds to be Subject to Nondestructive Examination

Fillet Welds (Shop and Field) - 10 percent of length of each fillet weld shall be tested as stated below:
Magnetic particle inspection may be used for the detection of cracks and other discontinuities at or near the surface of root and surface passes and intermediate layers not exceeding 1/4 inch thickness. Dye penetrant inspection should be used only for detection of discontinuities that are open to the surface in single pass fillet welds.

2.3.2.3 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.

2.3.2.4 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.

2.3.3 Structural Welding Repairs

Defective welds in the structural steel welding repairs shall be repaired in accordance with AWS D1.1, Subsection 3.7 or AWS D1.2 for aluminum. 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. 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. Driving and drifting bolts or keys will not be permitted.

3.2 TESTS

3.2.1 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 05120

STRUCTURAL STEEL

Item Number Number 8: Structural Steel

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein, including walers, and other structural steel elements related to anchor and bulkhead fabrications and connections.

1.2 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 INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 316	(1989) ASD Manual of Steel Construction

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 6/A 6M	(2003a) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 36/A 36M	(2003a) Carbon Structural Steel
ASTM A 53	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 307	(2002) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(2002) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 709/A 709M	(2003a) Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges
ASTM F 436	(2003) Hardened Steel Washers
ASTM F 959	(2002) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1	(2002) Structural Welding Code - Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 25	(1997; R 2000) Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Structural Steel System; G, DO

Structural Connections; G, DO

Shop and erection details including members (with their connections) not shown on the contract drawings. Welds shall be indicated by standard welding symbols in accordance with AWS A2.4.

SD-04 Samples

High Strength Bolts and Nuts; G, RO

Carbon Steel Bolts and Nuts; G, RO

Nuts Dimensional Style; G, RO

Washers; G, RO

Random samples of bolts, nuts, and washers as delivered to the job site if requested, taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

SD-05 Design Data

Erection; G, RO

Prior to erection, erection plan of the structural steel framing describing all necessary temporary supports, including the sequence of installation and removal.

SD-07 Certificates

Mill Test Reports; G, RO

Certified copies of mill test reports for structural steel, structural bolts, nuts, washers and other related structural steel

items, including attesting that the structural steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation.

Welder Qualifications; G, RO

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.1.

Fabrication; G, RO

A copy of the AISC certificate indicating that the fabrication plant meets the specified structural steelwork category.

1.4 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

2.1.1 Carbon Grade Steel

Carbon grade steel shall conform to ASTM A 36/A 36M.

2.1.2 Carbon and High-Strength Low-Alloy Steel

Carbon and high-strength low-alloy steel shall conform to ASTM A 709/A 709M.

2.2 STEEL PIPE

Steel pipe shall conform to ASTM A 53, Type ES or Type S, Grade B.

2.3 HIGH STRENGTH BOLTS AND NUTS

High strength bolts shall conform to ASTM A 325, Type 1 with carbon steel nuts conforming to ASTM A 563, Grade C.

2.4 CARBON STEEL BOLTS AND NUTS

Carbon steel bolts shall conform to ASTM A 307, Grade A with carbon steel nuts conforming to ASTM A 563, Grade A.

2.5 NUTS DIMENSIONAL STYLE

Carbon steel nuts shall be Heavy Hex style when used with ASTM A 307 bolts or Heavy Hex style when used with ASTM A 325 bolts.

2.6 WASHERS

Plain washers shall conform to ASTM F 436. Other types, when required, shall conform to ASTM F 959.

2.7 PAINT

Paint shall conform to SSPC Paint 25. Steel members to be encased in concrete shall receive a shop prime coat only.

PART 3 EXECUTION

3.1 GENERAL

Structural steel fabrication and erection shall be performed by an organization experienced in structural steel work of equivalent magnitude. The Contractor shall be responsible for correctness of detailing, fabrication, and for the correct fitting of structural members. Connections, for any part of the structure not shown on the contract drawings, shall be considered simple shear connections and shall be designed and detailed in accordance with pertinent provisions of AISC S329. Substitution of sections or modification of connection details will not be accepted unless approved by the Contracting Officer. Welding shall be in accordance with AWS D1.1. High-strength bolting shall be in accordance with AISC S329.

3.2 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC ASD Manual. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC quality certification program for Category I structural steelwork. Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M. Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with the AISC ASD Manual and primed with the specified paint.

3.3 ERECTION

Erection of structural steel shall be in accordance with the applicable provisions of AISC ASD Manual.

3.3.1 Structural Connections

Anchor bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work. Field-welded structural connections shall be completed before load is applied. Field-drilled holes shall be sub-drilled and reamed to proper size. Field welding, including welder qualifications, prequalification of weld details and inspection of welds shall conform to AWS D1.1.

3.3.2 Field Priming

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

-- End of Section --

SECTION 05502A

METALS: MISCELLANEOUS, STANDARD ARTICLES, SHOP FABRICATED ITEMS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and instilling (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein. Work associated with this Section shall be considered incidental to work described elsewhere in the Contract.

1.2 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 ASD1	(1997) Aluminum Standards and Data

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSAE)

ASSAE A14.3	(1992) Safety Requirements for Fixed Ladders

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2003a) Carbon Structural Steel
ASTM A 53	(2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2002) Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
ASTM A 325	(2002) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(2003) Structural Bolts, Steel, Heat Treated, 830 Mpa Minimum Tensile Strength (Metric)
ASTM A 572/A 572M	(2003a) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 709/A 709M	(2003) Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars

and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges

FEDERAL SPECIFICATIONS (FS)

FS RR-F-621 (Rev E) Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Shop Fabricated Metal Items; G, DO

Detail drawings shall be submitted for approval as specified and in Section 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-03 Product Data

Miscellaneous Metals and Standard Metal Articles; G, RO

Shop Fabricated Metal Items; G, RO

Lists of materials shall be submitted for approval as specified and in Section 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-06 Test Reports

Miscellaneous Metals and Standard Metal Articles; G, RO

Shop Fabricated Metal Items; G, RO

Certified test reports for materials tests and analyses shall be submitted for approval as specified and in Section 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-04 Samples

Miscellaneous Metals and Standard Metal Articles; G, RO

Shop Fabricated Metal Items; G, RO

Samples shall be submitted for approval as specified and in Section 05055A 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-13 Records

Miscellaneous Metals and Standard Metal Articles; G, RO

Shop Fabricated Metal Items; G, RO

Records which identify the disposition of approved material and fabricated items in the work must be submitted for approval as specified and in Section 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

1.4 FABRICATION AND WORKMANSHIP REQUIREMENTS

Fabrication requirements and workmanship provisions for items specified in this section shall conform with the requirements of Section 05055A 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 709/A 709M, Grade 36/A 709M, Grade 36.

2.1.2 Steel Pipes and Pipe Fittings

2.1.2.1 Pipes

ASTM A 53, Type E or S, Grade B, seamless or electric-resistance welded, nominal size and weight class or outside diameter and nominal wall thickness as shown.

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 05055A METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.2.1 Gratings

Gratings 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.

2.2.2 Support Structure for Interpretive Signs

Aluminum tubing material shall be aluminum alloy 6061-T6, and aluminum plates shall be aluminum alloy 5052-H32, both conforming to the requirements of AA ASD1.

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 07920

JOINT SEALANTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein. Work described herein shall be considered incidental to work described elsewhere in this Contract.

1.2 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 509	(2000) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 570	(2000) Oil- and Resin-Base Caulking Compound for Building Construction
ASTM C 734	(2001) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 834	(2000EL) Latex Sealants
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM C 1085	(1991) Butyl Rubber-Based Solvent-Release Sealants
ASTM C 1184	(1995) Structural Silicone-Sealants
ASTM D 217	(2002) Cone Penetration of Lubricating Grease
ASTM D 1056	(1991) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1565	(1981; R 1990) Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
ASTM E 84	(2003) Surface Burning Characteristics of Building Materials

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL

PROCEDURES:

SD-03 Product Data

Materials

Submit manufacturer's product data pertaining to caulking, sealants, solvents and cleaning agents.

1.4 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 40 to 90 degrees F when the sealants are applied.

1.5 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between 40 and 90 degrees F unless otherwise specified by the manufacturer.

PART 2 PRODUCTS

2.1 CAULKING

Oil- and resin-based caulking shall comply with ASTM C 570

2.2 SEALANT

2.2.1 LATEX

Latex Sealant shall comply with ASTM C 834.

2.3 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.3 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

3.2 APPLICATION

3.2.1 Masking Tape

Masking tape shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

3.2.2 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

3.2.3 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

3.2.4 Primer

Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

3.2.5 Sealant

Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Joints shall be sealed as detailed in the drawings. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

-- End of Section --

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, handling, and installing (as applicable) all material, labor, equipment, tools and incidentals necessary to complete the work specified herein. Work described herein shall be considered incidental to work described elsewhere in this Contract.

1.2 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 0100Doc	(2001) Documentation of the Threshold Limit Values and Biological Exposure Indices

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1500	(Rev A) Sealer, Surface (Latex Block Filler)
CID A-A-2834	(Rev A) Urethane, Waterborne (Low VOC, Clear)
CID A-A-2867	(Basic) Coating, Polyurethane, Single Component Moisture Cure, Alipathic
CID A-A-2962	(Basic) Enamel, Alkyd

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 20	(1991) Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)
SSPC Paint 23	(1982) Latex Primer for Steel surfaces
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 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1982; R 2000) Power Tool Cleaning
SSPC SP 6	(2000) Commercial Blast Cleaning
SSPC SP 7	(2000) Brush-Off Blast Cleaning

1.3 SUBMITTALS

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

SD-03 Product Data

Paint; G, RO

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials regardless of quantities in states where VOC content limitations apply.

SD-06 Test Reports

Paint; G, RO

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 50 gallons:

a. A test report showing that the proposed batch to be used meets specified requirements:

b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements, plus, on the proposed batch to be used, a report of test results for properties of weight per gallon, viscosity, fineness of grind, drying time, color, and gloss.

SD-08 Manufacturer's Instructions

Mixing and Thinning; G, RO

Application; G, RO

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times between coats for epoxy, moisture-curing polyurethane, and liquid glaze coatings. Detailed application instructions for textured coatings shall be provided.

1.4 PACKAGING, LABELING, AND STORING

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

of need to allow 30 days for testing.

1.5 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense.

1.6 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be between 45 and 95 degrees F when applying coatings other than water-thinned, epoxy, and moisture-curing polyurethane coatings. Water-thinned coatings shall be applied only when ambient temperature is between 50 and 90 degrees F. Epoxy, and moisture-curing polyurethane coatings shall be applied only within the minimum and maximum temperatures recommended by the coating manufacturer. Moisture-curing polyurethane shall not be applied when the relative humidity is below 30 percent.

1.7 SAFETY AND HEALTH

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH-02, or as required by a more stringent applicable regulation.

1.7.2 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

1.7.3 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.7.4 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

PART 2 PRODUCTS

2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall conform to the requirements listed in the painting schedules at the end of this section, except when the required amount of a material of a particular batch is 50 gallons or less, an approved first-line proprietary paint material with similar intended formulation, usage and color to that specified may be used. Additional requirements are as follows:

2.1.1 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content (calculated as lead metal) shall not be used.

2.1.2 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

2.1.3 Volatile Organic Compound (VOC) Content

Paints shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to the restrictions of the local air pollution control authority.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Surfaces contaminated by coating materials shall be restored to original condition.

3.2 SURFACE PREPARATION

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

3.2.1 Ferrous Surfaces

This work includes the application of a shop coat only. Do not apply shop coat to steel H-Piles and sheeting elements consisting of Marine Grade A 690 steel. Ferrous surfaces including those that have been shop-coated, shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be cleaned mechanically with hand tools according to SSPC SP 2, power tools according to SSPC SP 3 or by sandblasting according to SSPC SP 7. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

3.3 MIXING AND THINNING

When thinning is approved as necessary to suit surface, temperature, weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.4 APPLICATION

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

3.4.1 Ventilation

Affected areas shall be ventilated during paint application so that workers exposure to chemical substances shall not exceed limits as established by ACGIH-02, or as required by a more stringent applicable regulation. Interior work zones having a volume of 10,000 cubic feet or less shall be ventilated at a minimum of 2 air exchanges per hour. Ventilation in larger work zones shall be maintained by means of mechanical exhaust. Solvent vapors shall be exhausted outdoors, away from air intakes and workers. Return air inlets in the work zone shall be temporarily sealed before start of work until the coatings have dried.

3.4.2 Respirators

Operators and personnel in the vicinity of operating paint sprayers shall wear respirators.

3.5 SURFACES TO BE PAINTED

Surfaces listed in the painting schedules at the end of this section shall be painted as scheduled.

3.6 PAINTING SCHEDULES

The following painting schedules identify the surfaces to be painted and prescribe the paint to be used and the number of coats of paint to be applied. Contractor options are indicated by ------or------ between optional systems or coats.

EXTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Ferrous metal unless otherwise specified	SSPC Paint 5		
	SSPC Paint 25		
	SSPC Paint 23		

-- End of Section --

SECTION 10430

EXTERIOR SIGNAGE

Item Number 60: Interpretive Sign Type - A
Item Number 61: Interpretive Sign Type - B

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The work includes furnishing, delivering, and installing (as applicable) all material, labor, equipment, tools, and incidentals necessary to complete the work specified herein.

1.2 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 the designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes

ASTM INTERNATIONAL (ASTM)

ASTM D 3841	(1997; R 2001) Glass-Fiber-Reinforced Polyester Plastic Panels

AMERICAN WELDING SOCIETY (AWS)

AWS D1.2	(2003) Structural Welding Code Aluminum

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Drawings for Interpretive Signs; G, RO.

Submit drawings showing scaled details of interpretive signs, including elevations of each type of sign; dimensions, details, and methods of mounting; shape and thickness of materials; and details of construction. A schedule showing the location, sign type, and message shall be included. Drawings shall be submitted at least 30 days prior to start of construction.

SD-03 Product Data

Interpretive Signs.

Submit manufacturer's descriptive data and catalog cuts at least 30 days prior to starting work. Manufacturer's installation instructions and cleaning instructions shall be included.

Graphics For Interpretive Signs; G, RO.

Submit hard copy and electronic copy of graphic layout of interpretive signs at least 60 days prior to starting work. Graphic layout shall be based on message content and design plans provided by the Contracting Officer.

Wind Load Requirements.

Submit design analysis and supporting calculations performed in support of signs at least 30 days prior to starting work.

SD-04 Samples

Support System for Interpretive Signs; G, RO.

Submit one 12 inch length of tubular aluminum leg, one 6-inch x 6-inch sample of aluminum plate, and one 12 inch length of moulding to be used for sign support systems at least 30 days prior to starting work.

Fiberglass Image Embedded Graphic Panels; G, RO.

At least 30 days prior to starting work, submit 12-inch x 12-inch sample of fiberglass reinforced plastic to be used for the fiberglass image embedded graphic panels. The sample shall be embedded with a portion of an actual graphic to be used.

SD-06 Test Reports

Testing.
Submit a report of post-installation test results for each interpretive sign within 3 days of installation.

SD-07 Certificates

Testing Laboratory Qualifications; G, RO.
Submit qualifications of the commercial testing laboratory when test reports are submitted.

1.4 GENERAL

All interpretive signs, including Type-A and Type-B as shown on the plans, shall be provided by a single manufacturer. Signs shall be of the detail, sizes, and types shown on the drawings, shall conform to the requirements specified herein, and shall be provided at the locations indicated. Message content and design shall be provided to the Contractor by the Contracting Officer. Signs shall be complete with support system as detailed, as well as related components, for a complete installation.

1.5 WIND LOAD REQUIREMENTS

Interpretive signs shall be designed to withstand 60 mph windload.

1.6 QUALIFICATIONS

Signs shall be the standard product of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

1.7 DELIVERY AND STORAGE

Materials shall be wrapped for shipment and storage, delivered to the jobsite in manufacturer's original packaging, and stored in a clean, dry area in accordance with manufacturer's instructions.

1.8 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 INTERPRETIVE SIGNS

Dimensions, details, and materials for interpretive signs, Types A and B, shall be in accordance with the plans and specifications. The Contractor shall provide 1 Type-A sign and 3 Type-B signs.

2.1.1 Support System for Interpretive Signs

Aluminum materials for support for the interpretive signs shall be in accordance with Section 05502A METALS: MISCELLANEOUS, STANDARD ARTICLES, SHOP FABRICATED ITEMS.

Interior framing shall consist of an aluminum plate welded to aluminum molding and riveted to side supports as shown on the plans. Side supports shall consist of tubular aluminum panel supports welded to the post. Framing members shall be designed to permit fiberglass image embedded graphic panel removal as shown on the plans. Posts shall be one-piece tubular aluminum legs designed to accept panel framing system as shown on the plans. Openings shall be sealed from moisture and made tamper-proof.

2.1.1.1 Finishes

Framing members shall be finished with two coats of a two-component low-gloss polyurethane enamel; color charcoal. All surfaces to receive the coating shall be sandblasted.

2.1.2 Fiberglass Image Embedded Graphic Panels

Fiberglass image embedded graphic panels shall be provided in sizes shown on drawings. Panels shall be fabricated a minimum of 0.125 inch fiberglass reinforced plastic (FRP). FRP shall be in accordance with ASTM D 3841, Type II, Grade 1, Class 124, as approved by the Contracting Officer. Panels shall be designed to be interchangeable. A total of 5 panels shall be provided for each sign as shown on the plans.

2.2 GRAPHICS FOR INTERPRETIVE SIGNS

2.2.1 Graphics

Sign graphics shall be fabricated using one of the following processes:

a. Silkscreen: Message shall be applied to panel using the silkscreen process. Silkscreened images shall be executed with photo screens prepared from original art. Original art shall be defined as artwork that is a first generation pattern of the original specified art. Edges and corners shall be clean. Rounded corners, cut or ragged edges, edge buildup, bleeding or surfaces pinholes will not be accepted. Handcut screens will not be accepted.

f. Digitally Imaged Embedment: A digitally imaged copy of the sign m essage shall be embedded in the FRP sheet and completely covered with thermosetting polyester resin. Message shall be embedded minimum 1/32 inch. Sheets shall be processed in one piece, in one process, to prevent delamination.

2.2.2 Message Content

Message content and design plans for interpretive signs, including colors, and font type and size, shall be provided to the Contractor by the Contracting Officer.

2.4 SHOP FABRICATION AND MANUFACTURE

2.4.1 Factory Workmanship

Work shall be assembled in the shop, as far as practical, ready for installation at the site. Work that cannot be shop assembled shall be given a trial fit in the shop to ensure proper field assembly. Holes for bolts and screws shall be drilled or punched. Drilling and punching shall produce clean, true lines and surfaces. Welding to or on structural aluminum shall be in accordance with AWS D1.2. Welding shall be continuous along the entire area of contact. Exposed welds shall be ground smooth. Exposed surfaces of work shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practical. Joints exposed to the weather shall be formed to exclude water. Drainage and weep holes shall be included as required to prevent condensation buildup.

2.4.2 Dissimilar Materials

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of asphalt varnish or a coat of zinc-molybdate primer to prevent galvanic or corrosive action.

2.5 Concrete Footing

Materials for concrete footings shall conform to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

PART 3 EXECUTION

3.1 INSTALLATION

Items shall be shipped knocked-down ready for site assembly. Packaged components shall be complete, including all accessories and hardware. New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. Prior to installation, the Contracting Officer will inspect all parts.

The Contractor shall verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of signs. Signs shall be installed plumb and true at mounting heights and locations indicated on the plans, and in accordance with approved manufacturer's instructions and at the direction of the Contracting Officer.

The Contractor shall excavate and compact for each interpretive sign and set the signs as shown on the plans. Excavation and formwork shall be approved by the Contracting Officer prior to pouring concrete.

Any vegetation within preserved areas damaged by the work under this section, as determined by the Contracting Officer, shall be replaced immediately after the completion of the work at no additional cost to the Government.

3.2 TESTING

Each interpretive sign shall be tested to determine a secure and correct installation. The Contractor shall determine that the installation is correct by measuring the physical dimensions and clearance of each installed sign for compliance with manufacturer's recommendations and/or as shown on the plans. Signs which do not comply shall be reinstalled. Written reports describing the results of the testing for the signs shall be submitted.

Where re-installation is required, the following shall be accomplished:

a. Re-install the product as specified. Material acquisition of replacement parts is the responsibility of the Contractor. Replacement materials that are new and supplied by the original manufacturer to match original materials are required.

b. Repair damage caused by the failed installation.

3.3 RESTORATION, CLEAN UP, AND PROTECTION

3.3.1 RESTORATION AND CLEAN UP

When installation of interpretive signs have been completed, the Contractor shall restore any areas damaged during installation operations to their original conditions.

Installation work areas shall also be cleaned up, including the removal of any excess materials. The Contractor shall remove damaged, excess, and waste materials from the Project Site and dispose of the materials off Government property.

Newly installed signs shall be cleaned of dirt, stains, filings, excess materials, and other blemishes occurring from shipment and reinstallation

or installation to the satisfaction of the Contracting Officer. Cleaning methods and agents shall be according to manufacturer's instructions or as indicated.

3.3.2 PROTECTION

Interpretive signs shall be protected against damage during construction. Hardware shall be adjusted for proper operation. Fiberglass, support systems, and other sign surfaces shall be cleaned in accordance with manufacturer's instructions. After signs are completed and inspected, the Contractor shall cover the signs and maintain the cover until it is instructed to be removed by the Contracting Officer or until the facility is to be opened to the public. Signs shall be cleaned, as required, at time of cover removal.

-- End of Section --