N60478.AR.001713
NWS EARLE
5090.3a

REMEDIAL ACTION WORK PLAN FINAL DESIGN ANALYSIS FOR SUBMISSION REMEDIAL ACTION AT OPERABLE UNIT 6 (OU 6) SITE 3 AND SITE 10 VOLUME 3 OF 3 NWS EARLE NJ

7/1/2002

FOSTER WHEELER ENVIRONMENTAL CORPORATION

REMEDIAL ACTION WORK PLAN

FINAL
Soil Erosion and Sediment Control Plan
for
Submission
Remedial Action at
Operable Unit 6 (Sites 3 and 10)

VOLUME III of III

NAVAL WEAPONS STATION EARLE
Colts Neck, New Jersey

Prepared for:

ENGINEERING FIELD ACTIVITY NORTHEAST (EFANE)
10 Industrial Highway
LESTER, PA 19113

Contract Number N62472-99-D-0032
Contract Task Order 040

July 2002

Prepared by:

FOSTER WHEELER ENVIRONMENTAL CORPORATION (FWENC)
One Oxford Valley, Suite 200
LANGHORNE, PA 19047-1829

FINAL
Soil Erosion and Sediment Control Plan for Submission Remedial Action at Operable Unit 6 (Sites 3 and 10)

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Revision	Date	Prepared by	Approved by	Pages Affected
0	09/10/01	K. Bogatch	F. Ahtchi-Ali	All
1	07/15/02	K. Bogatch	F. Ahtchi-Ali	All

This Soil Erosion and Sediment Control Plan (SESC Plan) is prepared for the remedial actions to be conducted at Sites 3 and 10 located in Operable Unit 6 (OU-6) at the Naval Weapons Station Earle (NWS Earle), in Colts Neck, New Jersey. The SESC Plan was prepared by Foster Wheeler Environmental Corporation (FWENC) for the Engineering Field Activity Northeast (EFANE) in response to Contract No. N62472-99-D-0032, Contract Task Order 040.

ATTACHMENTS

ATTACHMENT #1	Soil Erosion and Sediment Control Plan – Site 3
ATTACHMENT #2	Soil Erosion and Sediment Control Plan – Site 10

ATTACHMENT #1

Soil Erosion and Sediment Control Plan – Site 3

New Jersey Natural Resources Conservation Program

FREEHOLD SOIL CONSERVATION DISTRICT
(Serving Middlesex and Monmouth Counties)

211 FREEHOLD ROAD
MANALAPAN, NEW JERSEY 07726
Tel: (732) 446-2300
Fax: (732) 446-9140

1/3/02

US NAVAL WEAPONS STATION EARLE
201 HIGHWAY 34 SOUTH
COLTS NECK NJ 07722

Ref.#: 2001-0524
Proj.: US NAVAL WEAPONS STATION - SITE 3
Twp. : COLTS NECK
Block: N/A
Lots : N/A

*** CERTIFICATION LETTER ***

Pursuant to N.J.S.A. 4:24-39 et seq., the N.J. Soil Erosion and Sediment Control Act, the Freehold Soil Conservation District hereby grants certification of the soil erosion and sediment control plan for the above referenced project, subject to the following:

1. That the applicant carries out all land disturbance activities in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, promulgated by the State Soil Conservation Committee.

2. The owner/applicant must obtain a District issued Report of Compliance prior to the issuance of any Certificates of Occupancy by the municipality.

3. Changes in the certified plan relating to, or that will affect land disturbance on the site, must be submitted to the District office for certification.

A copy of the certified plan must be kept on the job site at all times.

This certification is valid for 3 ½ years, or for 2 years in the event the project is for mining, landfill, or storage and is limited to the controls specified in this plan. It is not authorization to engage in proposed land use unless the municipality or other controlling agency has previously approved such use. Failure to comply with the above conditions may result in the issuance of a **STOP CONSTRUCTION ORDER.**

Sincerely,

Ines M. Grimm
District Manager

DISTRIBUTION: **WHITE** - Applicant **CANARY** - District **WHITE** - Appl. Eng.
CANARY - Municipal Eng. **PINK** - Construction Official
GOLD - Plan. Board

Prepare in quintuplicate (original and 4 copies)

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
NORTHNAVFACENGCOM 4335/3 (Rev. 6/80)

CONTROL NO. 002B

CONTRACT NO.	DELIVERY ORDER #	ACTIVITY LOCATION
N62472-99-D-0032	**0040**	**NWS Earle, Colts Neck, New Jersey**

PROJECT TITLE:
Landfill Capping OU-6, Sites 3 & 10

FROM:	DATE
Foster Wheeler Environmental Corp. – Program QCM: Tom Kelly	December 7, 2001
TO:	**DATE**
C. Davis (CD)	December 7, 2001

1. THE CONTRACTOR SUBMITTALS LISTED BELOW ARE FORWARDED FOR YOUR REVIEW AND RECOMMENDATIONS.
   (a) APPLY APPROPRIATE STAMP IMPRINT TO EACH SUBMITTAL AND INDICATE REVIEW COMMENTS, AS REQUIRED.
   (b) RETAIN ONE (1) COPY OF THIS TRANSMITTAL FORM AND RETURN REMAINING COPIES WITH REVIEWED SUBMITTALS TO ROICC.
2. THESE SUBMITTALS SHOULD BE RETURNED TO THIS OFFICE BY _____
3. NO RESPONSE REQUIRED _____

COPY TO:

[x] D. ZARI (1 COPY), L. BURG (1COPY) [X] J. KOLICIUS (1 COPY), S. BEEBE (1COPY) [X] FREEHOLD SOIL CONSERVATION DISTRICT (3 COPIES)

R W 12/7/2001
SIGNATURE AND DATE

FROM: DESIGNER	DATE
TO: ROICC	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE RETURNED, WITH ACTION TAKEN AS INDICATED.
2. _____

COPY TO:

[ ] ROICC [ ] DESIGNER

SIGNATURE AND DATE

FROM: ROICC	DATE
TO: CONTRACTOR	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE APPROVED/DISAPPROVED AS SHOWN BELOW AND ON EACH STAMP IMPRINT.

COPY TO:
[ ] ROICC [ ] OTHER

FOR COMMANDING OFFICER, ENGINEERING FIELD ACTIVITY – NORTHEAST, NAVAL FACILITIES ENGINEERING COMMAND — DATE

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
2	SD-08, Statements; REVISED Soil Erosion and Sediment Control Plan Report – Site 3	R. Woodworth			Submittal includes: Calculations & Drawings

FOSTER WHEELER ENVIRONMENTAL CORPORATION

December 7, 2001

Mr. Ben Shotland
Resource Conservationist II
Freehold Soil Conservation District
211 Freehold Road
Manalapan, New Jersey 07726

RE: Navy Weapons Station Earle – Site 3
Colts Neck, Monmouth County, New Jersey
FSCD Reference Number 2001-0524

Dear Mr. Shotland,

This letter serves to address the items mentioned in the Freehold Soil Conservation District's (FSCD's), "Initial Review Letter", dated September 21, 2001. Further, this letter serves to transmit information and supporting documentation regarding a design modification made to the proposed drainage swales located on the eastern and western sides as well as the interior of the landfill area at Site 3. For ease of review of this letter, the FSCD comment as written in the September 21, 2001 letter, are repeated in italics, followed by the Department of the Navy's response.

"1. Submit the balance of $1050.00"

As discussed during our pre-submission meeting and as per the FSCD's Pricing Schedule, dated June 2000, for Mining, Quarrying, Landfill & Storage Activities at a site between 5,000 square feet and 25 acres, the initial application fee requires a Review and Certification Fee of $335.00 and a Inspection and Enforcement Fee of $450.00. Further, due to the size of the site, a New Jersey Department of Environmental Protection (NJDEP), Bureau of Nonpoint Pollution Control, NJPDES General Stormwater Permit is required for the construction activities. This application fee for this permit is $200.00. Based on these fees, on August 21, 2001, a check in the amount of $785.00 was submitted to the FSCD along with the initial Soil Erosion and Sediment Control Plan Application package. Further, a second check, made out to Treasurer, State of New Jersey, in the amount of $200.00 was also included as part of the initial submission to cover the application fee for the NJPDES General Stormwater Permit.

As per a telephone conversation held between Foster Wheeler Environmental Corporation (FWENC) and yourself, it appears that an error was made by the FSCD in the preparation of the Initial Review Letter and the correct fee of $985.00 was submitted. Therefore, it does not appear that any further consideration to Item 1 of the September 21, 2001 Initial Review Letter is warranted at this time.

2300 Lincoln Highway East, One Oxford Valley, Suite 200, Langhorne, PA 19047-1829
Phone (215) 702-4000 Fax (215) 702-4045

"2. Provide non-growing season specifications."

As requested, non-growing season stabilization specifications are included on Sheet C-2 of the Revised Soil Erosion and Sediment Control Plans.

"3. Provide erosion control matting details for steep slopes."

No erosion control matting is proposed to be utilized during construction of the proposed project. Steep slopes will be stabilized with riprap, as appropriate and as detailed in the Revised Soil Erosion and Sediment Control Plans. A representative of Foster Wheeler Environmental Corporation (FWENC) contacted you, via telephone, to discuss this matter. During this conversation, it was determined that the FSCD would like this detail to be presented on the drawings so that if matting is determined to be needed by FSCD Inspectors, details for its use will be available on the plans. Therefore, as requested, a detail associated with erosion control matting is included on Sheet C-2 of the Revised Soil Erosion and Sediment Control Plans.

"4. Provide turbidity barrier detail."

As discussed during our last telephone conversation, there are no brooks, streams, rivers or other water bodies subject to flowing water conditions located on Site 3. Therefore, the need for a turbidity barrier does not appear to be warranted nor is it proposed for this project. However, if a turbidity barrier is determined to be needed during construction of the project by a FSCD Inspector, a detail for a turbidity barrier is presented on Sheet C-2 of the Revised Soil Erosion and Sediment Control Plans.

"5. E retardance velocity for proposed swale is 2.8 which exceeds velocity for this soil type."

As previously stated, this letter also serves to alert the FSCD and seek approval of a design change associated with the proposed drainage swales to be constructed as part of the subject project. As you are aware, grass lined swales were initially proposed to be constructed along the eastern and western sides of the subject site, as well as the interior of the landfill area, to collect and direct stormwater to undeveloped wooded areas to the south of the subject site. The swales were designed to have a trapezoidal section with a bottom width of two feet (2'), a top width of fourteen feet (14') and side slopes of three (3) horizontal to one (1) vertical (i.e., 3:1). The design depth of the swale was initially proposed to be two feet (2'). After consideration of the FSCD's comment concerning the E retardance velocity as well as potential problems associated with the maintenance of grass lined swales at a large Naval facility such as Earle, FWENC proposes to line the swales with filter fabric and a six-inch (6") layer of three-inch (3") diameter riprap in lieu of establishing vegetation within the swale corridor.

Based on this proposal, the three swales to be constructed on Site 3 were redesigned to have a trapezoidal section with a bottom width of one foot (1'), a top width of seven feet (7') and side slopes of two (2) horizontal to one (1) vertical (i.e., 2:1). The new design depth of the riprap lined swale is 1.5 feet. As previously stated, the swales will be lined with six inches (6") of three inch (3") diameter riprap.

As depicted in the attached calculations, a swale with the aforementioned design parameters can handle a flow of 23.65 cubic feet per second (ft^3/s). This capacity greatly exceeds the largest on-site anticipated flow from a 25-year design storm of 12.84 ft^3/s (the proposed conditions of $Q_1 + Q_3$).

With regard to concerns over an increase in off-site flow, as shown in the Soil Erosion and Sediment Control Plan Report dated August 29, 2001, the existing conditions at the site in the two affected drainage areas (EDA-1 and EDA-2) are subject to off-site flows of 71.69 ft^3/s (EDA-1) and 6.11 ft^3/s (EDA-2) during the 25-year storm event. Under the proposed conditions, utilizing a riprap lined swale with the aforementioned dimensions, drainge areas PDA-1 and PDA-2 will be subject to off-site flows of 76.30 ft^3/s and 7.91 ft^3/s, respectively. The increases in flow represent a 6% (EDA-1 versus a combination of PDA-1 and PDA-3) and 2.3% (EDA-2 versus PDA-2) increase in off-site flow during the 25-year storm event. FWENC believes this increase in flow to be insignificant. Further, as stated in the August 29, 2001 submittal, all areas located downgradient of the discharge points and the remainder of Site 3 that will be subject to this insignificant increase in off-site stormwater flow consist of undeveloped wooded areas owned by the Navy. The stormwater and design calculations referenced above are attached to this letter.

In addition, due to the change in proposed swale lining (i.e., riprap versus grass), the size of the conduit outlet protection apron associated with the discharge point of the eastern/interior swale change. However, in order to adequately protect the steep slope located adjacent to the outlet point of this swale, the entire sideslope located adjacent to the outlet point will be stabilized with six (6) inches of three (3) inch diameter riprap. The area covered with riprap will greatly exceed the area calculated for the apron utilizing Standard 12-1 as well as the length of 20' requested by the FSCD in the Initial Review Letter. The Width 1 of this apron will be 21'. Width 2 will be 30'. The actual proposed length of the apron, as shown on the Revised Soil Erosion and Sediment Control Plans is 70'.

With regard to the conduit outlet protection apron associated with the swale located on the western side of the landfill area (i.e., PDA-2), the entire sideslope of the outlet point will be stabilized with riprap. The area covered with riprap greatly exceeds the area calculated for the apron, as well as the length requested by the FSCD of 18'. The Width 1 of this apron will be 21'. Width 2 will be 30'. The actual proposed length of the apron, as shown on the Revised Soil Erosion and Sediment Control Plans is 40'.

Revised construction details associated with the riprap lining of the proposed swale channel and the conduit outlet protection apron are shown on the attached Soil Erosion and Sediment Control Plans.

"6. Length for PDA #1 should be 20' and length for PDA #2 should be 18."

The lengths of the two aprons have been redesigned based on a modification to the proposed swale dimensions and lining (i.e., riprap versus grass). Please refer to the response to Item #5 as well as the attached Revised Soil Erosion and Sediment Control Plan depicting the dimensions of the proposed conduit outlet protection aprons. As you will note, to protect the steep slopes located adjacent to the discharge points of the proposed swales, conduit outlet protection aprons have been designed the area of which greatly exceeds the calculated dimensions utilizing Standard 12-1. The proposed lengths of the two conduit outlet protection aprons of 70' and 40', respectively exceed the requested lengths of 20' and 18'.

"7. Provide site-specific profiles of swales and swale through final outfall area."

Site specific profiles of all swales proposed to be constructed on Site 3 are depicted on Sheet C-7 of the Revised Soil Erosion and Sediment Control Plans.

Please review the enclosed documents and contact FWENC with any questions or comments. If you should have any questions, comments or require any additional information, please do not hesitate to contact me at (973) 630-8224. For you convenience, I can be reached via electronic mail at kbogatch@fwenc.com. FWENC's facsimile number is (973) 630-8474.

Very truly yours,

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Keith J. Bogatch, P.E.
Senior Civil Engineer

w/enclosures

cc: R. Woodworth (FWENC)

I:\bogatchk\Earle Navy Base\Freehold Resp Ltr Site 3.doc

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ENGINEERING CALCULATION COVER SHEET

U.S. Naval Weapons Station – Earle
Landfill Capping OU-6
Site 3
Colts Neck, New Jersey

Prepared for:

Department of the Navy
EFA – Northeast
10 Industrial Highway
Lester, Pennsylvania

Prepared by:

Foster Wheeler Environmental Corporation
Langhorne, Pennsylvania

CALCULATIONS:

Drainage Calculations

Prepared under the Supervision of:

Keith J. Bogatch
New Jersey P.E. License No. 40369

Revision	Prepared by	Reviewed by	Approved by	Date	Pages Affected
1	D. Martoccia	K. Bogatch	K. Bogatch	Dec. 7, 2001	All

2300 LINCOLN HIGHWAY EAST, ONE OXFORD VALLEY, SUITE 200, LANGHORNE, PA 19047-1829
PHONE (215) 702-4000 FAX (215) 702-4045

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 – Q1 (PDA1)	KJB	10/8/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Top Soil (B)	Top of Landfill, Grass (Area = 45,086 ft²)	61			1.04	63.44
Lakehurst Sand (B)	Cleared + Grubbed, Re-Vegetated (Area = 24,546 ft²)	61			0.56	34.16
Lakehurst Sand (B)	Woods - Grass Combination (Area = 129,022 ft²)	65			2.96	192.4
[1] Use only one CN source per line				Totals ➡	4.56	290.0

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{290}{4.56} = 63.6$; Use CN ➡ **64**

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.71	1.74	2.26

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Back of Worksheet 2: Site 3 - Q1 (PDA 1)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{64} - 10 = 5.63$$

2 yr storm

$$Q = \frac{(P-0.25)^2}{P+0.8S} = \frac{[3.5-0.2(5.63)]^2}{3.5+(0.8)(5.63)} = \frac{5.64}{8.0} = 0.71''$$

10 yr storm

$$Q = \frac{[5.25-0.2(5.63)]^2}{5.25+(0.8)(5.63)} = \frac{17.01}{9.75} = 1.74''$$

25 yr storm

$$Q = \frac{[6.0-0.2(5.63)]^2}{6.0+0.8(5.63)} = \frac{23.76}{10.50} = 2.26''$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q1 (PDA1)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID	AB	BC	DE
1. Surface description (table 3-1)	Dense Grass		Rip Rap (6" diam)
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.25	0.032
3. Flow length, L (total L † 300 ft) ft	140	20	20
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	3.5
5. Land slope, s ft/ft	0.05	0.33	0.083
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.21	+ 0.02	+ 0.007 = 0.237

Shallow concentrated flow

Segment ID		
7. Surface description (paved or unpaved)		
8. Flow length, L ft		
9. Watercourse slope, s ft/ft		
10. Average velocity, V (figure 3-1) ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+ =

Channel flow

Segment ID	CD	
12. Cross sectional flow area, a ft^2	6.0	
13. Wetted perimeter, p_w ft	7.70	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	0.78	
15 Channel slope, s ft/ft	0.01	
16. Manning's roughness coefficient, n	0.032	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	3.95	
18. Flow length, L ft	815	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.057	+ = 0.057
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		0.294

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q (PDA1)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

1. Data

Drainage area ..... A_m = 0.007 mi^2 (acres/640)

Runoff curve number ..... CN = 64 (From worksheet 2)

Time of concentration ..... T_c = 0.294 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.125	1.125	1.125
5. Compute I_a/P		0.321	0.214	0.188
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4– III)	csm/in	430	475	480
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.71	1.74	2.26
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	2.14	5.79	7.59
(Where $q_p = q_u A_m Q F_p$) + Q_{Full} (36" RCP)		63.46	63.46	63.46
+ Q_3 (PDA3)		1.17	3.95	5.25
Q_{total} (ft^3/s)		66.77	73.20	76.30

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q_2 (PDA2)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi^2 ☐ %	Product of CN x area
Top Soil (B)	Top of Landfill, Grass (Area = 56,506 ft^2)	61			1.30	79.3
Lakehurst Sand (B)	Cleared + Grubbed, Re-Vegetated (Area = 23,992 ft^2)	61			0.55	33.55
Lakehurst Sand (B)	Woods - Grass Combination (Area = 99,991 ft^2)	65			2.30	149.5
[1] Use only one CN source per line				Totals ➡	4.15	262.35

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{262.35}{4.15} = 63.2$; Use CN ➡ **63**

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.66	1.67	2.18

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Back of Worksheet 2: Site 3 - Q2 (PDA 2)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{63} - 10 = 5.87$$

2 yr storm

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{[3.5 - 0.2(5.87)]^2}{3.5 + 0.8(5.87)} = \frac{5.41}{8.20} = 0.66''$$

10 yr storm

$$Q = \frac{[5.25 - 0.2(5.87)]^2}{5.25 + 0.8(5.87)} = \frac{16.61}{9.95} = 1.67''$$

25 yr storm

$$Q = \frac{[6.0 - 0.2(5.87)]^2}{6.0 + 0.8(5.87)} = \frac{23.29}{10.70} = 2.18''$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q_2 (PDA 2)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID	AB	BC	DE
1. Surface description (table 3-1)	Dense Grass		Rip Rap
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.25	0.032
3. Flow length, L (total L † 300 ft) ft	25	20	55
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	3.5
5. Land slope, s ft/ft	0.05	0.33	0.20
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.054	+ 0.021	− 0.011 = 0.086

Shallow concentrated flow

Segment ID		
7. Surface description (paved or unpaved)		
8. Flow length, L ft		
9. Watercourse slope, s ft/ft		
10. Average velocity, V (figure 3-1) ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+ =

Channel flow

Segment ID	CD	
12. Cross sectional flow area, a ft^2	6.0	
13. Wetted perimeter, p_w ft	7.70	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	0.779	
15 Channel slope, s ft/ft	0.01	
16. Manning's roughness coefficient, n	0.032	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	3.94	
18. Flow length, L ft	743	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.052	+ = 0.052
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		0.138

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q_2 (PDA2)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

1. Data

Drainage area ..... A_m = 0.006 mi^2 (acres/640)

Runoff curve number ..... CN = 63 (From worksheet 2)

Time of concentration ..... T_c = 0.138 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

	Storm #1	Storm #2	Storm #3
2 Frequency ..... yr	2	10	25
3. Rainfall, P (24-hour) ..... in	3.5	5.25	6.0
4. Initial abstraction, I_a ..... in (Use CN with table 4-1)	1.175	1.175	1.175
5. Compute I_a / P	0.34	0.22	0.20
6. Unit peak discharge, q_u ..... csm/in (Use T_c and I_a / P with exhibit 4– III)	510	600	605
7. Runoff, Q ..... in (From worksheet 2) Figure 2-6	0.66	1.67	2.18
8. Pond and swamp adjustment factor, F_p ..... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)	1.0	1.0	1.0
9. Peak discharge, q_p ..... ft^3/s	2.02	6.01	7.91

(Where $q_p = q_u A_m Q F_p$)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q_3 (PDA3)	KJB	10/6/01

Check one: ☐ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Top Soil (B)	Top of Landfill, Grass (Area = 111,255 ft²)	61			2.55	155.55
Lakehurst Sand (B)	Cleared + Grubbed, Re-Vegetated (Area = 9,725 ft²)	61			0.22	13.42
Lakehurst Sand (B)	Woods - Grass Combination (Area = 12,202 ft²)	65			0.28	18.2
[1] Use only one CN source per line				Totals ➡	3.05	187.17

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{187.17}{3.05} = 61.4$; Use CN ➡ 61

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.57	1.52	2.0

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Back of Worksheet 2: Site 3 - Q3 (PDA 3)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{61} - 10 = 6.39$$

2 yr storm

$$Q = \frac{(P-0.2S)^2}{P+0.8S} = \frac{[3.5 - 0.2(6.39)]^2}{3.5 + 0.8(6.39)} = \frac{4.94}{8.61} = 0.57''$$

10 yr storm

$$Q = \frac{[5.25 - 0.2(6.39)]^2}{5.25 + 0.8(6.39)} = \frac{15.78}{10.36} = 1.52''$$

25 yr storm

$$Q = \frac{[6.0 - 0.2(6.39)]^2}{6.0 + 0.8(6.39)} = \frac{22.30}{11.11} = 2.0''$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q_3 (PDA3)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Segment ID	AB	CD			
1. Surface description (table 3-1)	Dense Grass	Rip Rap			
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.03			
3. Flow length, L (total L † 300 ft) ft	112	20			
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5			
5. Land slope, s ft/ft	0.05	0.20			
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t hr	0.18	+ 0.011	=	0.19	

Segment ID					
7. Surface description (paved or unpaved)					
8. Flow length, L ft					
9. Watercourse slope, s ft/ft					
10. Average velocity, V (figure 3-1) ft/s					
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		+		=	

Segment ID	BC				
12. Cross sectional flow area, a ft^2	6.0				
13. Wetted perimeter, p_w ft	7.70				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	0.779				
15 Channel slope, s ft/ft	0.01				
16. Manning's roughness coefficient, n	0.032				
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V ft/s	3.94				
18. Flow length, L ft	749				
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.053	+		=	0.053
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr					0.243

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
Navy - Earle	DMM	10/5/01
Location	**Checked**	**Date**
Site 3 - Q_3 (PDA3)	KJB	10/6/01

Check one: ☐ Present ☒ Developed

1. Data

Drainage area ..... A_m = 0.005 mi^2 (acres/640)

Runoff curve number ..... CN = 61 (From worksheet 2)

Time of concentration ..... T_c = 0.243 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

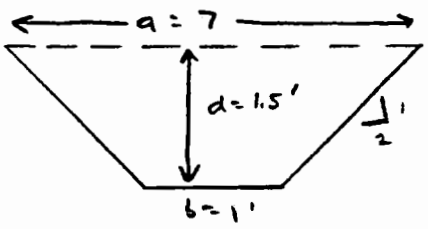
		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.279	1.279	1.279
5. Compute I_a / P		0.37	0.24	0.21
6. Unit peak discharge, q_u (Use T_c and I_a / P with exhibit 4- III)	csm/in	410	520	525
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.57	1.52	2.0
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	1.17	3.95	5.25

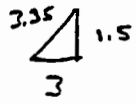
(Where $q_p = q_u A_m Q F_p$)

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 10/8/01 SHEET 1 OF 3
CHKD. BY KJB DATE 10/9/01 OFS NO. DEPT. NO.
CLIENT Navy Earle
PROJECT Site 3
SUBJECT Proposed Swale Calculations

Assumed Dimensions:





Find Area (A):

$= 1/2\,(d)(a+b)$
$= 1/2\,(1.5)[2(2)(1.5) + 1 + 1]$
$= 6.0\ ft^2$

Find Wetted Perimeter (WP):

$WP = 2(3.35) + 1$
$= 7.70\ ft$

Find Hydraulic Radius (R):

$R = A/WP$
$= 6.0 / 7.70 = 0.779$

Find Q for swale:

Slope = 1% = 0.01 (Design)
n = 0.032 (3" diam. riprap – NJ Soil Conservation Manual)

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

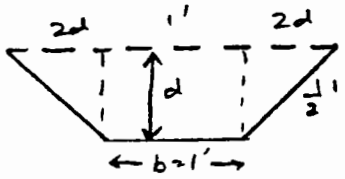
$$= \frac{1.49}{0.032} (6.0)(0.779)^{2/3}(0.01)^{1/2}$$

$= 23.65\ ft^3/s = Q_{Full}$

$\therefore\ Q_{Full} \gg Q_{25}$
$23.65 \gg 12.84$ DESIGN IS ADEQUATE

Use Manning's Equation:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$



$$A = \tfrac{1}{2} d (a + b)$$
$$= \tfrac{1}{2} d [1 + (2d + 2d + 1)]$$
$$= \tfrac{1}{2} d (4d + 2)$$
$$= 2d^2 + d$$

$$WP = 2.24d + 2.24d + 1$$
$$= 4.48d + 1$$

$$R = \frac{A}{WP} = \frac{2d^2 + d}{4.48d + 1}$$

$S = 0.01$ (design)

$$\text{Max } Q = 7.59 (Q_1) + 5.25 (Q_3)$$
$$= 12.84 \text{ ft}^3/\text{s}$$

$$12.84 = \frac{1.49}{0.032} (2d^2 + d) \left[\frac{2d^2 + d}{4.48d + 1}\right]^{2/3} (0.01)^{1/2}$$

$d = 1.15'$

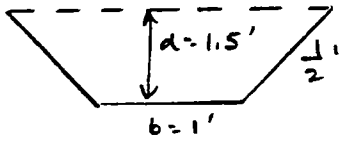
Design $d = 1.5'$

$1.15' < 1.5'$ ∴ Design is adequate

Freeboard $= 1.5' - 1.15'$
$= 0.35$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 10/8/01 SHEET 3 OF 3
CHKD. BY KJB DATE 10/9/01 OFS NO. DEPT. NO.
CLIENT Navy Earle
PROJECT Site 3
SUBJECT Proposed Riprap Design for Swales



Design "n" = 0.032
S = 0.01
Q_{25} = 12.66 ft^3/s

From Standard 23 of NJSESC Manual:

I Calculate b/d Ratio:

$= \frac{1}{1.5} = 0.667$

II Obtain P/R Ratio from Curve 23-2 using b/d = 0.667

∴ P/R = 9

III Obtain d_{50} from Curve 23-3A using:

S = 0.01
Q = 12.66 ft^3/s
P/R = 9

$$d_{50} = 12 (118\, Q\, S^{13/6}\, R/P)^{2/5}$$
$$= 12 \left[118 (12.66)(0.01)^{13/6} \left(\tfrac{1}{9}\right)\right]^{2/5}$$
$$= 12 (0.0077)^{2/5}$$
$$= 1.71$$

Assume d_{50} = 3"

IV From Curve 23.1, actual "n" for d_{50} = 3" is:

n = 0.0315

∴ Design n ≈ Actual n

V Thickness – As filter fabric will be used, thickness is equal to 2 x d_{50}
= 2(3) = 6" thick

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 11/6/01 SHEET 1 OF 1

CHKD. BY KJB DATE 11/7/01 OFS NO. DEPT. NO.

CLIENT Navy

PROJECT Earle - Site 3

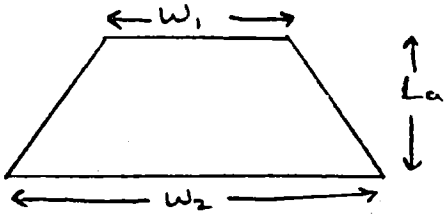
SUBJECT Conduit Outlet Protection ($Q_1 + Q_3$)

Using Standard 12 of NJSESC Standards:

- Q_{25} (TR-55) in Swale = $Q_1 + Q_3 = 2.26 + 2.0 = 4.26'$

- Find Length of Apron (L_a)

$$L_a = \left(1.8 \frac{q}{D_o^{1/2}}\right) + 7 D_o$$



D_o for 25 yr storm = 1.15'

W_o = 7'

$$q = \frac{Q_{25}}{W_o} = \frac{4.26 \text{ ft}}{7 \text{ ft}} = 0.609$$

$$\therefore \quad L_a = 1.8 \left(\frac{0.609}{(1.15)^{1/2}}\right) + 7(1.15) = 9.07 \approx 9'$$

Width 1 (W_1) = $3W_o = 3(7) = 21'$

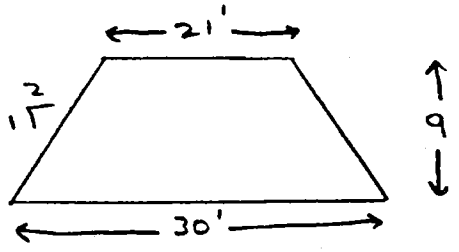
Width 2 (W_2) = $3W_o + L_a = 21 + 9' = 30'$

Median Stone Diameter (d_{50}):

$$d_{50} = \frac{0.016}{0.2 D_o} q^{1.33} = \frac{0.016}{0.2(1.15)} (0.609)^{1.33} = 0.036''$$

Use 3" ϕ

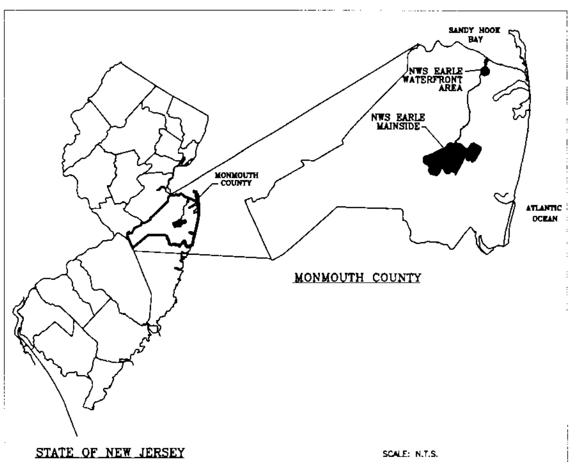
Thickness = $2 d_{50} = 2(3) = 6''$

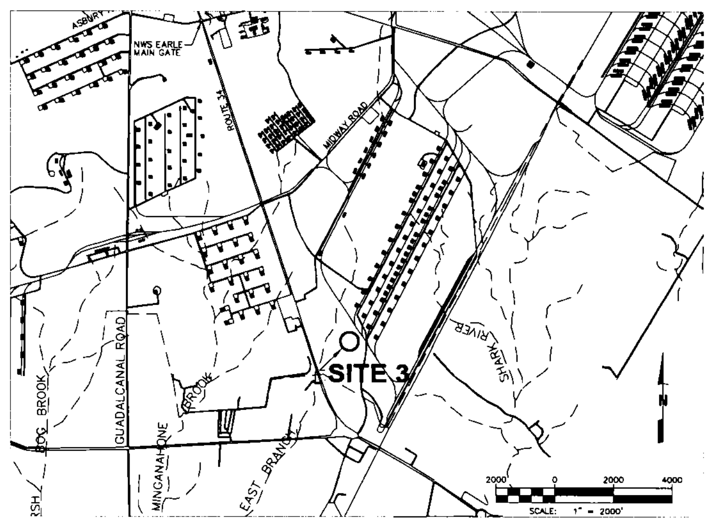


REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN (1)
NAVAL WEAPONS STATION EARLE - SITE 3
COLTS NECK, MONMOUTH COUNTY, NEW JERSEY
RAC CONTRACT NO. N62472-99-D-0032

DRAWING INDEX:

DRAWING NO.	DRAWING TITLE
T-1	TITLE SHEET
C-1	GENERAL NOTES AND PROPOSED SEQUENCE OF CONSTRUCTION
C-2	SOIL EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
C-3	EXISTING SITE CONDITIONS
C-4	CLEARING AND GRUBBING, AND SOIL EROSION AND SEDIMENT CONTROL MEASURES
C-5	FINAL GRADING PLAN
C-6	CAP SECTIONS AND DETAILS AND STORMWATER MANAGEMENT DETAILS
(2) C-7	SWALE PROFILES





REV.	DESCRIPTION	PREP BY	DATE	APPRVD
1	PLAN REVISION INCLUDES CHANGE FROM GRASS LINED TO RIP-RAP LINED SWALE			
2	ADDITION OF DRAWING C-7 AS PER FSCD INITIAL REVIEW LETTER (9/21/01)			

FOSTER WHEELER ENVIRONMENTAL

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 3
TITLE SHEET

DATE 12/7/01
SCALE: AS NOTED
CONSTR. CONTR. NO. N62472-99-D-0032
SIZE D
DWG. SH. NO. T-1

GENERAL NOTES

1. EXISTING TOPOGRAPHIC DATA IS BASED ON FIELD SURVEYS PERFORMED BY BOUCHER & JAMES, INC., DOYLESTOWN, PA IN JUNE 2001. SEE SHEET C-3 FOR EXISTING SITE CONDITIONS.
2. HORIZONTAL DATUM BASED UPON NEW JERSEY STATE PLANE COORDINATES NAD83 AND VERTICAL DATUM BASED UPON NAVD88 AS FURNISHED BY RESIDENT OFFICER IN CHARGE OF CONSTRUCTION OFFICE AT THE NAVAL WEAPONS STATION – EARLE FOR THE FOLLOWING MONITORING WELLS:

WELL ID.	NORTH	EAST	TOP OF OUTER CASING
MW3-04	510703.97	591611.40	122.90
MW3-08	510628.47	591620.78	118.84

3. ELEVATIONS ARE BASED ON MEAN SEA LEVEL DATUM NAVD88.
4. THE CONTOURS SHOWN HEREON ARE AT 1 FOOT INTERVALS. SEE SHEETS C-3, C-4 AND C-5.
5. THE REMEDIAL ACTION CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING HORIZONTAL AND VERTICAL CONTROLS FOR THE LANDFILL CAP CONSTRUCTION.
6. ALL WORK FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS; APPLICABLE SECTIONS OF THE NEW JERSEY DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, DATED 1996; AND THE STANDARDS FOR SOIL EROSION AND SEDIMENT IN NEW JERSEY, ADOPTED JULY 1999. ALL METHODS OF WORK FOR THIS PROJECT SHALL ALSO COMPLY WITH FEDERAL, STATE OF NEW JERSEY, AND LOCAL ORDINANCES, UNLESS OTHERWISE NOTED IN THE CONTRACT DRAWINGS AND SPECIFICATIONS.
7. THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER A MINIMUM OF THREE WORKING DAYS PRIOR TO INTRUSIVE ACTIVITIES AT SITE 3 TO ALLOW TIME FOR COORDINATION WITH APPROPRIATE BASE PERSONNEL AND TO ENSURE THAT ALL PROCEDURES ARE IN COMPLIANCE.
8. THE CONTRACTOR SHALL CONTACT THE "NJ ONE CALL SYSTEM" A MINIMUM OF FIVE AND A MAXIMUM OF TEN WORKING DAYS PRIOR TO ANY INTRUSIVE ACTIVITIES. THE PHONE NUMBER IS 1-800-272-1000. UTILITIES SHOWN ON THE DRAWINGS ARE BASED UPON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY AND ALLOW FOR THEIR LOCATIONS. IF A UTILITY IS IN CONFLICT, THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER AND APPROPRIATE UTILITY TO RESOLVE THE CONFLICT.
9. THE APPROXIMATE LIMITS OF THE LANDFILL BOUNDARY WERE DETERMINED BY FOSTER WHEELER ENVIRONMENTAL CORPORATION DURING A JUNE 2001 SITE INVESTIGATION SOIL BORING PROGRAM.
10. THE CONTRACTOR SHALL CLEAR TREES AND SHRUBS WITHIN THE LIMITS OF DISTURBANCE. NO TREES AND SHRUBS OUTSIDE THESE LIMITS ARE TO BE DISTURBED WITHOUT AUTHORIZATION BY THE CONTRACTING OFFICER.
11. ADEQUATE SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR, AS PER THE ATTACHED DRAWINGS, PRIOR TO LANDFILL CAP CONSTRUCTION ACTIVITIES. ALL DISTURBED AREAS SHALL BE STABILIZED (HYDROSEEDED, RIPRAPPED, OR COVERED WITH STONE) IMMEDIATELY UPON ESTABLISHING FINAL GRADE.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING ALL WORK TO THE IMMEDIATE PROJECT AREA. ALL AREAS DISTURBED BY THE CONTRACTOR THAT ARE OUTSIDE THE LIMITS OF DISTURBANCE SHALL BE RESTORED TO THE ORIGINAL CONDITIONS BY THE CONTRACTOR AND APPROVED BY THE CONTRACTING OFFICER.
13. FIGURE DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS. CHECK GRAPHIC SCALE BEFORE SCALING DRAWINGS.
14. THE CONTRACTOR SHALL THOROUGHLY INSPECT SITE 3 PRIOR TO CONSTRUCTION TO VERIFY EXISTING SITE CONDITIONS. VERIFICATION OF EXISTING SITE CONDITIONS WILL INCLUDE BUT NOT BE LIMITED TO, STAKING THE LOCATION OF ALL AREAS TO BE WITHIN THE LIMITS OF DISTURBANCE PRIOR TO ACTUAL WORK. THE FIELD LOCATION STAKES MUST BE REVIEWED AND APPROVED BY THE CONTRACTING OFFICER PRIOR TO DISTURBANCE ACTIVITIES.
15. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING GRADES THAT SUSTAIN POSITIVE DRAINAGE THROUGHOUT LANDFILL CAP CONSTRUCTION ACTIVITIES.
16. THE STABILIZED CONSTRUCTION ENTRANCE FOR SITE 3 SHALL BE THE SOLE POINT FOR SITE INGRESS AND EGRESS. THE CONTRACTOR SHALL CONSTRUCT THE STABILIZED CONSTRUCTION ENTRANCE AT THE LOCATION SHOWN ON SHEET C-4 AND AS PER THE DETAIL ON SHEET C-2.
17. THE LOCATION OF THE CONTRACTOR STAGING AREAS MUST BE APPROVED BY THE CONTRACTING OFFICER AND SHALL NOT CONFLICT WITH TRAFFIC OR PEDESTRIAN FLOW. ALL STAGING AREAS SHALL BE LOCATED WITHIN THE LIMITS OF DISTURBANCE AS DEPICTED ON SHEET C-4.
18. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CONTRACTING OFFICER IN THE EVENT THE PROPOSED LIMITS OF THE CAP REQUIRE DESIGN REVISION OR MODIFICATION.
19. ALL WORK AREAS SHALL BE MAINTAINED FREE FROM DUST AND ODORS.
20. EVIDENCE OF WETLANDS WAS NOT OBSERVED AT OR SURROUNDING SITE 3 DURING THE DELINEATION INVESTIGATION. IN THE EVENT WETLANDS ARE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CEASE WORK IN THESE AREAS AND NOTIFY THE CONTRACTING OFFICER.
21. DRAWINGS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL CONSTRUCTION SHALL BE PERFORMED IN COMPLIANCE WITH THE APPROVED HEALTH AND SAFETY PLAN, AND IN ACCORDANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT, AND ALL RULES AND REGULATIONS THERETO APPURTENANT.
22. CONTRACTOR SHALL FURNISH SIGNALMENT AND SUCH WARNING SIGNS AS ARE NECESSARY TO PROVIDE ADEQUATE WARNING TO THE PUBLIC OF HIS OPERATIONS.
23. ALL ASPHALT ROADWAYS ARE TO BE SWEPT FREE OF SOIL, SEDIMENT, AND DEBRIS ON A DAILY BASIS AND ADDITIONALLY AS DIRECTED BY THE CONTRACTING OFFICER.
24. THE SITE'S APPROVAL LETTER, APPROVED SOIL EROSION AND SEDIMENT CONTROL PLAN, DAILY LOG BOOKS AND TEST REPORTS SHALL BE AVAILABLE AT THE SITE AT ALL TIMES.
25. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED, WITH PERMISSION OF THE CONTRACTING OFFICER, WITHIN THIRTY (30) DAYS, FOLLOWING THE ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE AREAS.
26. FOR FINISHED GRADING, THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS SO AS TO PREVENT WATER FROM STANDING ON THE SURFACE FOR MORE THAN TWENTY FOUR (24) HOURS AFTER THE END OF A RAINFALL EVENT EXCEPT IN DESIGNATED DRAINAGE COURSES AND SWALE FLOW AREAS, WHICH MAY DRAIN AS LONG AS FORTY-EIGHT (48) HOURS AFTER THE END OF A RAINFALL. AREAS DESIGNED TO HAVE STANDING WATER SHALL NOT BE REQUIRED TO MEET THIS REQUIREMENT.
27. THE CONTRACTING OFFICER HAS THE OPTION OF REQUIRING ADDITIONAL SAFETY, EROSION OR SEDIMENT CONTROL MEASURES, IF DEEMED NECESSARY.

PROPOSED SEQUENCE OF CONSTRUCTION AT SITE 3

TASK	DURATION WORKING DAYS
1. MOBILIZE SITE	5
2. SWEEP THE WORK AREA FOR UNEXPLODED ORDNANCES	5
3. INSTALL SOIL EROSION AND SEDIMENT CONTROL MEASURES	10
4. CLEARING AND GRUBBING OF SITE WITHIN LIMITS OF DISTURBANCE	5
5. PERFORM TEST PIT OPERATIONS AND CONDUCT SITE SURVEY	10
6. CONSTRUCT AND STABILIZE TEMPORARY SITE ACCESS ROADS	5
7. PLACE AND GRADE SUBGRADE	10
8. CONSTRUCT LANDFILL CAP	20
9. CONSTRUCT PERMANENT SECURITY FENCING	5
10. SEED SITE AND CONSTRUCT FINAL SITE SURVEY	10
11. DEMOBILIZE SITE AND REMOVE SOIL EROSION AND SEDIMENT CONTROL MEASURES	3

NOTE: TASKS ON SITE 3 TO BE PERFORMED BETWEEN 3/1/02 AND 7/1/02. (SUBJECT TO CHANGE PENDING SIGNING OF THE RECORD OF DECISION)

FOSTER WHEELER ENVIRONMENTAL

REV	DESCRIPTION	PREP BY	DATE	APPROVD

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND — NORTHDIV — LESTER — CIVIL WORKS

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3
GENERAL NOTES AND PROPOSED SEQUENCE OF CONSTRUCTION

APPROVED — DATE — ESFNE FOR COMMANDER, NAVFAC

KEITH BOGARDUS, P.E.
NJPE NO. 40388

SAV TO — DATE 12/7/01

CODE I.D. NO.
SCALE: NONE
SPEC. NO.
CONSTRN. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.

SHEET 2 OF 6
SIZE: D
DES. SH. NO. C-1

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN THIRTY (30) DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
3. PERMANENT VEGETATION TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING. MULCHING IS REQUIRED ON ALL SEEDING. WHEN HYDROSEEDING, MULCH SHALL NOT BE INCLUDED IN THE TANK WITH THE SEED.
4. ALL WORK TO BE DONE IN ACCORDANCE WITH THE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL OF NEW JERSEY.
5. A SUBBASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUBBASE SHALL BE INSTALLED WITHIN FIFTEEN (15) DAYS OF THE PRELIMINARY GRADING.
6. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE A TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
7. ANY SLOPES GREATER THAN 3V:1H RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION CONTINUES.
8. THE STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A STONE PAD OF 1 1/2" TO 2" STONE, AT ALL CONSTRUCTION DRIVEWAYS, IMMEDIATELY AFTER INITIAL SITE DISTURBANCE.
9. IN ACCORDANCE WITH THE STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A PH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE COVERED WITH A MINIMUM OF TWELVE (12) INCHES OF SOIL HAVING A PH OF 5 OR MORE PRIOR TO SEED BED PREPARATION. AREAS WHERE TREES OR SHRUBS ARE TO BE PLANTED SHALL BE COVERED WITH A MINIMUM OF TWENTY-FOUR (24) INCHES OF SOIL HAVING A PH OF 5 OR MORE.
10. THE FREEHOLD SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED SEVENTY-TWO (72) HOURS IN ADVANCE OF ANY LAND DISTURBING ACTIVITY.
11. AT THE TIME THE SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER, SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NONVEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION SHALL BE EMPLOYED.
12. IN THAT N.J.S.A. 4:24-39 ET. SEQ. REQUIRES THAT NO CERTIFICATES OF OCCUPANCY BE ISSUED BEFORE THE PROVISIONS OF THE CERTIFIED PLAN FOR EROSION CONTROL HAVE BEEN COMPLIED WITH FOR PERMANENT MEASURES, ALL SITE WORK FOR SITE PLANS AND ALL WORK AROUND INDIVIDUAL LOTS IN SUBDIVISIONS, SHALL BE COMPLETED PRIOR TO THE DISTRICT ISSUING A REPORT OF COMPLIANCE FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY BY THE MUNICIPALITY.
13. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
14. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLANS SHALL REQUIRE THE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RECERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
15. UNFILTERED DEWATERING IS NOT PERMITTED. TAKE ALL NECESSARY PRECAUTIONS DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH STATE STANDARDS.
16. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE SHALL BE SPRINKLED UNTIL THE SURFACE IS WET, TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED IN ACCORDANCE WITH STATE STANDARDS FOR EROSION CONTROL.
17. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHTS-OF-WAY SHALL BE REMOVED IMMEDIATELY.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EROSION OR SEDIMENTATION THAT MAY OCCUR BELOW STORMWATER OUTFALLS OR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.
19. STOCKPILE AND STAGING LOCATIONS DETERMINED IN THE FIELD SHALL BE PLACED WITHIN THE LIMIT OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN. STAGING AND STOCKPILES NOT LOCATED WITHIN THE LIMIT OF DISTURBANCE SHALL REQUIRE CERTIFICATION OF A REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN. THE DISTRICT RESERVES THE RIGHT TO DETERMINE WHEN CERTIFICATION OF A NEW AND SEPARATE SOIL EROSION AND SEDIMENT CONTROL PLAN IS REQUIRED FOR THESE ACTIVITIES.
20. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE #2.

TEMPORARY SEEDING SPECIFICATIONS

ZONE 7 a, b SEED MIXTURE* (FROM TABLE 7-2 NEW JERSEY SESC STANDARDS)				FERTILIZER RATE (10-20-10)	LIME RATE
SPECIES	APPLICATION RATE (LB/AC)	SEEDING DATES	SEEDING DEPTH**		
PERENNIAL RYE GRASS	100	2/15-6/1 8/15-10/15	1/2 INCH	500 LB/AC (11 LB/1000 S.F.)	90 LB/1000 S.F.
PEARL MILLET	20	5/1-9/1	1.0 INCH		

* SEE TABLE 7-2 NEW JERSEY STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL FOR OTHER SPECIES SUITABLE FOR PLANTING OTHER THAN THOSE SPECIFIED IN THE TABLE ABOVE.

** TWICE THE DEPTH FOR SANDY SOIL.

A) APPLY GROUND LIMESTONE AT A RATE OF 90 LBS PER 1000 S.F.
B) APPLY FERTILIZER (10-20-10) AT A RATE OF 11 LBS PER 1000 S.F.
C) APPLY PERENNIAL RYEGRASS SEED AT 1 LB PER 100 ACRES AND PEARL MILLET AT 1 LB PER 20 ACRES.
D) APPLY HAY OR STRAW MULCH AT A RATE OF 90 LBS PER 1000 S.F.
E) APPLY A LIQUID MULCH BINDER OR TACK TO STRAW OR HAY MULCH.

PERMANENT SEEDING SPECIFICATIONS

UNITED STATES DEPARTMENT OF THE NAVY SEED MIXTURE				FERTILIZER RATE (10-20-10)	LIME RATE
SPECIES	APPLICATION RATE (LB/AC)	SEEDING DATES	SEEDING DEPTH		
TALL FESCUE	75	3/15 - 4/30 8/15 - 9/30	1/4 - 1/2 INCH	870 LB/AC (20 LB/1000 S.F.)	2,178 LB/AC (50 LB/1000 S.F.)
SERICEA LESPEDEZA	60	3/15 - 4/30 8/15 - 9/30	1/4 - 1/2 INCH		

A) APPLY TOPSOIL TO A DEPTH OF 6 INCHES (UNCOMPACTED)
B) APPLY GROUND LIMESTONE AT A RATE OF 50 LBS PER 1000 S.F. AND WORK FOUR INCHES INTO SOIL.
C) APPLY FERTILIZER (10-20-10) AT A RATE OF 20 LBS PER 1000 S.F.
D) APPLY TALL FESCUE SEED AT 1 LB PER 75 ACRES AND SERICEA LESPEDEZA AT 1 LB PER 60 ACRES.
E) APPLY HAY OR STRAW MULCH AT A RATE OF 90 LBS PER 1000 S.F.
F) APPLY A LIQUID MULCH BINDER OR TACK TO STRAW OR HAY MULCH.

NAVYRAC\EARLE\SITES3&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_3_C2.DWG

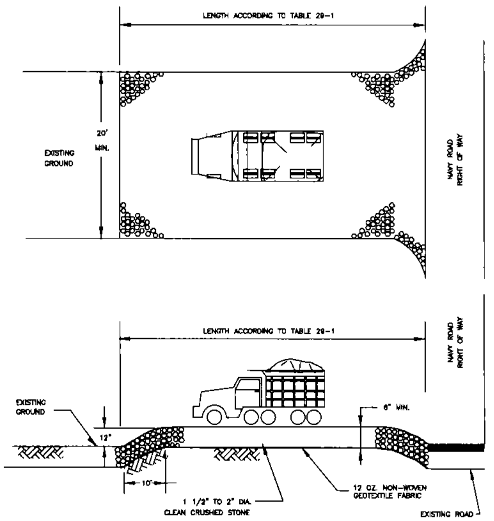
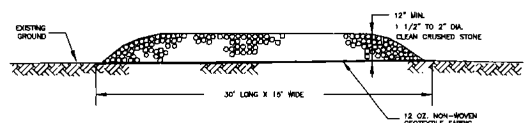


TABLE 29-1: LENGTHS OF CONSTRUCTION EXITS ON SLOPING ROADBEDS

PERCENT SLOPE OF ROADWAY	LENGTH OF STONE REQUIRED	
	COARSE GRAINED SOILS	FINE GRAINED SOILS
0 TO 2%	50 FT.	100 FT.
2 TO 5%	100 FT.	200 FT.
>5%	ENTIRE SURFACE STABILIZED WITH FABC BASE COURSE[1]	

1. AS PRESCRIBED BY LOCAL ORDINANCE OR OTHER GOVERNING AUTHORITY.

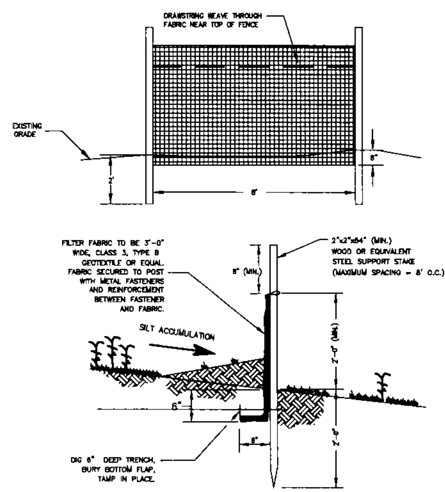
DETAIL 1/C-4 N.T.S. STABILIZED CONSTRUCTION ACCESS/EGRESS PLAN VIEW AND SECTION



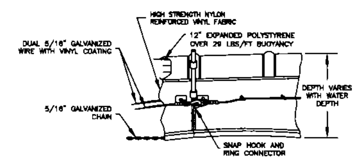
DETAIL 3/C-4 N.T.S. DECONTAMINATION PAD

NON-GROWING SEASON STABILIZATION SPECIFICATIONS (1)

PROTECTIVE MATERIAL	RATE	METHOD
UNROTTED SMALL-GRAIN STRAW OR SALT HAY	2.0-2.5 TONS/ACRE AT 90-115 LB PER 1000 S.F.	ANCHOR WITH MULCH ANCHORING TOOL, LIQUID MULCH BINDER OR NETTING TIE DOWN (SEE STANDARD 5-1 OF THE NEW JERSEY STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL)
ASPHALT EMULSION	600-1200 GALLONS PER ACRE	SUITABLE FOR SHORT PERIODS OF TIME IN LOW TRAVEL AREAS
SYNTHETIC OR ORGANIC SOIL STABILIZERS	PER MANUFACTURER	AS SUITABLE FOR SITE CONDITIONS
WOOD-FIBER OR PAPER-FIBER MULCH	1500 LB PER ACRE OR ACCORDING TO MANUFACTURER	APPLIED BY A HYDROSEEDER
MULCH NETTING	-	PAPER JUTE, EXCELSIOR, COTTON OR PLASTIC
WOOD CHIPS	TO A UNIFORM DEPTH OF 2 INCHES	NOT TO BE USED ON AREAS SUBJECT TO FLOWING WATER
GRAVEL/CRUSHED STONE/SLAG	9 CUBIC YARDS PER S.F. TO A MIMIMUM DEPTH OF 3 INCHES	USE SIZE 2 OR 3 (ASTM C-33)

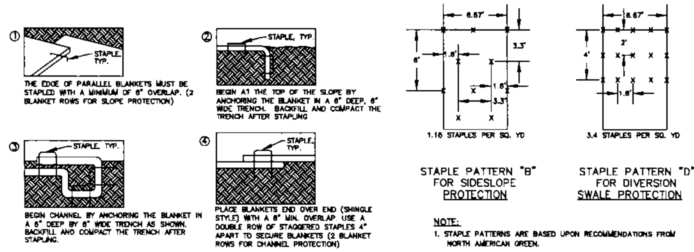


DETAIL 2/C-4 N.T.S. SILT FENCE CONSTRUCTION AND INSTALLATION (TYP)



(1) TURBIDITY BARRIER
N.T.S

NOTES:
1. SHALL BE CONSTRUCTED OF HIGH VISIBILITY MATERIAL.
2. BARRIER SHALL BE SIZED TO EXTEND TO THE WATER BODY BOTTOM.



NOTE:
1. STAPLE PATTERNS ARE BASED UPON RECOMMENDATIONS FROM NORTH AMERICAN GREEN.

(1) INSTALLATION DETAILS - EROSION CONTROL BLANKET
N.T.S.

DUST CONTROL NOTES

MATERIAL	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLON/ACRE
LATEX EMULSION	12.5:1	FINE SPRAY	235
RESIN IN WATER	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLON/ACRE
POLYACRYLAMIDE (PAM)-SPRAY ON POLYACRYLAMIDE (PAM)-DRY SPRAY	APPLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS. MAY ALSO BE USED AS AN ADDITIVE TO SEDIMENT BASINS TO FLOCCULATE AND PRECIPITATE SUSPENDED COLLOIDS. SEE SEDIMENT BASIN STANDARD		
ACIDULATED SOY BEAN SOAP STICK	NONE	COARSE SPRAY	1200

SECTION IV DUST CONTROL NOTES

THE FOLLOWING METHODS SHOULD BE CONSIDERED FOR CONTROLLING DUST:
A) MULCHES - SEE STANDARD FOR STABILIZATION WITH MULCHES
B) VEGETATIVE COVER - SEE STANDARD FOR TEMPORARY VEGETATIVE COVER, PERMANENT VEGETATIVE COVER FOR SOIL STABILIZATION, AND PERMANENT STABILIZATION WITH SOD.
C) SPRAY-ON ADHESIVES - ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS). KEEP TRAFFIC OFF THESE AREAS.
D) TILLAGE - TO ROUGHEN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS SPACED ABOUT 12 INCHES APART, AND SPRING-TOOTHED HARROWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.
E) SPRINKLING - SITE IS SPRINKLED UNTIL THE SURFACE IS WET.
F) BARRIERS - SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY, AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING.
G) CALCIUM CHLORIDE - SHALL BE IN THE FORM OF LOOSE, DRY GRANULATES OF FLAKES FINE ENOUGH TO FEED THROUGH COMMONLY USED SPREADERS AT A RATE THAT WILL KEEP SURFACE MOIST BUT NOT CAUSE POLLUTION OR PLANT DAMAGE. IF USED ON STEEPER SLOPES, THEN USE OTHER PRACTICES TO PREVENT WASHING INTO STREAMS, OR ACCUMULATION AROUND PLANTS.
H) STONE - COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL.

FOSTER WHEELER ENVIRONMENTAL

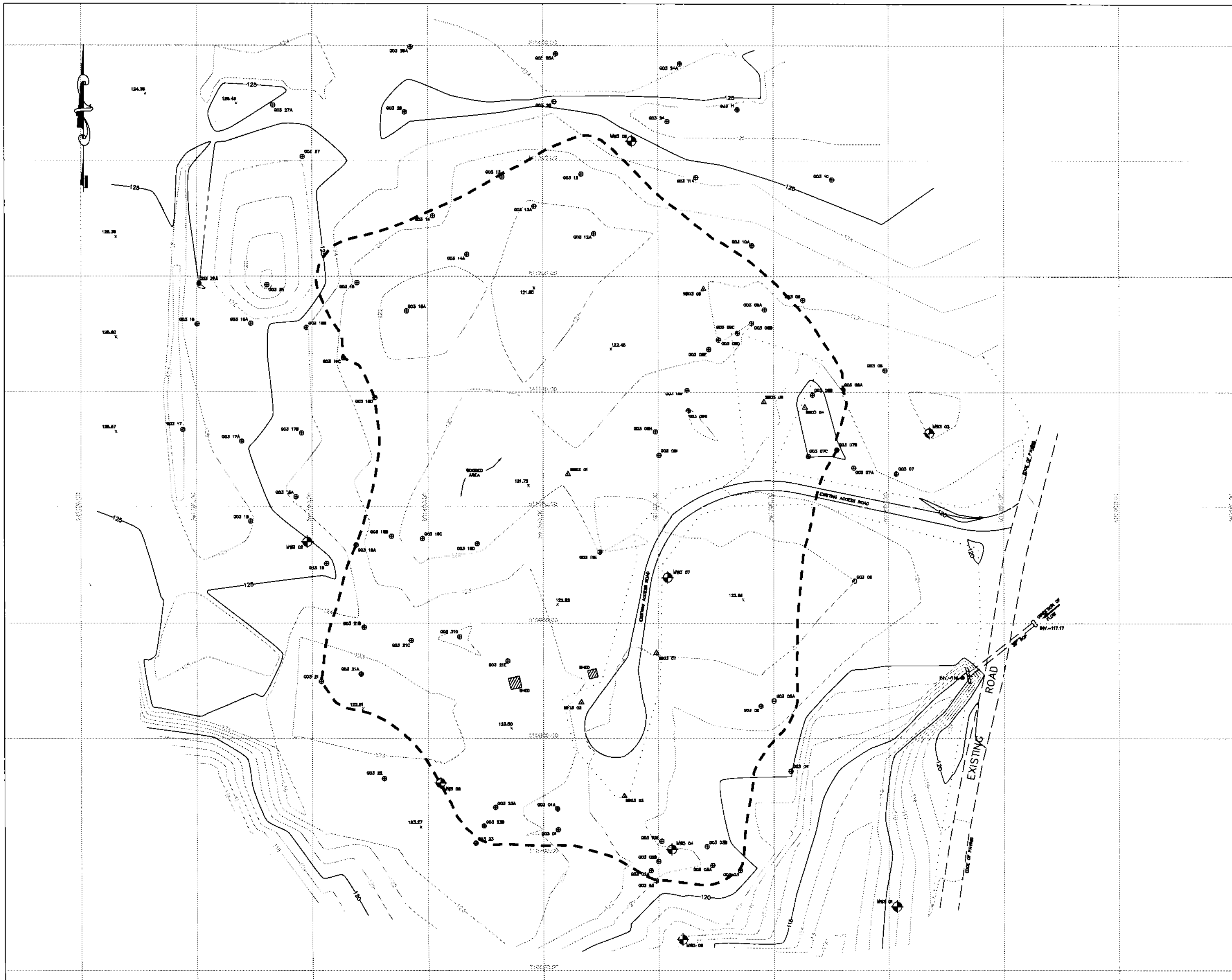
REV.	DESCRIPTION	PREP BY	DATE	APPRVD
(1)	ADDITION OF DETAILS AS PER THE FSCD's			
	INITIAL REVIEW LETTER (9/28/01)			

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND — PENNSYLVANIA / NEW JERSEY

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 3
SOIL EROSION AND SEDIMENT CONTROL PLAN NOTES AND DETAILS

KEITH BIGGARCH, P.E. NJPE NO. 40386
DATE 12/7/01
SCALE: N.T.S.
CONSTR. CONTR. NO. N62472-99-D-0032
SIZE D — DWG. SH. NO. C-2



NAVFAC\EARLE\SITES3&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_3_C3.DWG

LEGEND:

△ or ⊕	EXISTING SOIL BORING
⊕	EXISTING MONITORING WELL
x 113.33	EXISTING SPOT ELEVATION
— — —	APPROXIMATE LANDFILL BOUNDARY
· · · · ·	TREELINE
- - - - -	EXISTING MAJOR CONTOUR
········	EXISTING MINOR CONTOUR
RCP	EXISTING REINFORCED CONCRETE PIPE
— — —	EXISTING ROAD

0 40 80 120
Scale: 1"=40'

SOURCE:
TOPOGRAPHIC PLAN - SITE NO. 3, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

FOSTER WHEELER ENVIRONMENTAL

REV. | DESCRIPTION | PREP BY | DATE | APPRVD

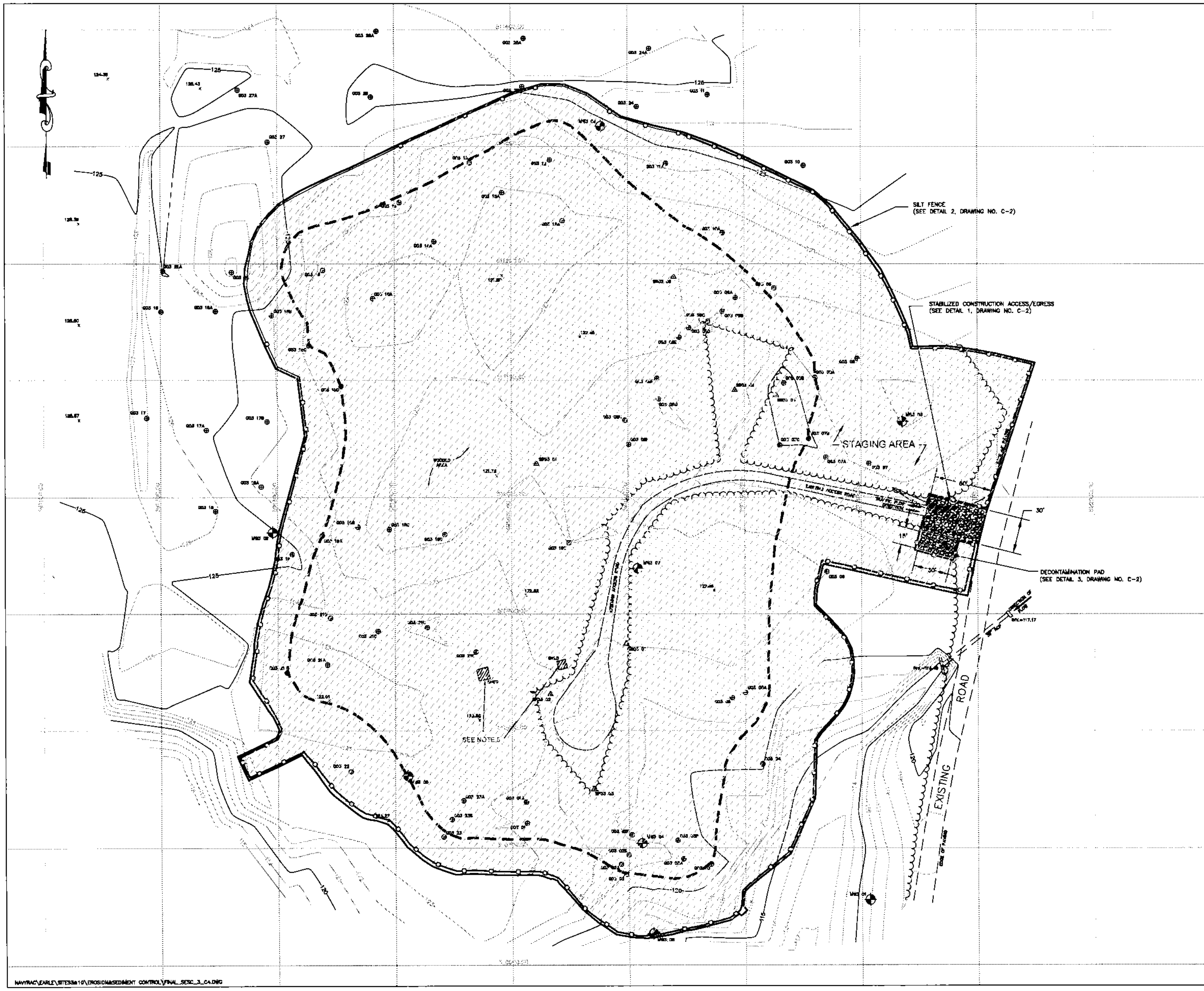
NAVAL FACILITIES ENGINEERING COMMAND

EPA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 3
EXISTING SITE CONDITIONS

KEITH BOGATCH, P.E.
NJPE NO. 403[illegible]

SAT TO | DATE 12/7/01
CODE I.D. NO.
SCALE : 1"=40'
SPEC. NO.
CONSTR. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET 4 OF 8
SIZE: D | DES. SH. NO. C-3



NOTES:

1. SILT FENCE IS LOCATED 1' WITHIN CLEARING AND GRUBBING BOUNDARY LINE.
2. CONTRACTOR SHALL DEMOLISH EXISTING SHEDS AND DISPOSE OFF-SITE ALL DEMOLITION DEBRIS OFF-SITE.

LEGEND:

- EXISTING SOIL BORING
- EXISTING MONITORING WELL
- EXISTING SPOT ELEVATION
- APPROXIMATE LANDFILL BOUNDARY
- TREELINE
- SILT FENCE
- LIMITS OF DISTURBANCE
- AREA TO BE CLEARED AND GRUBBED
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- RCP EXISTING REINFORCED CONCRETE PIPE
- EXISTING ROAD

SOURCE:

TOPOGRAPHIC PLAN – SITE NO. 3, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

FOSTER WHEELER ENVIRONMENTAL

REV.	DESCRIPTION	PREP BY	DATE	APPRVD

DEPARTMENT OF THE NAVY – NAVAL FACILITIES ENGINEERING COMMAND

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3
CLEARING AND GRUBBING, AND SOIL EROSION AND SEDIMENT CONTROL MEASURES

KEITH BOGATON, P.E.
NJPE NO. 40389

DATE 12/7/01

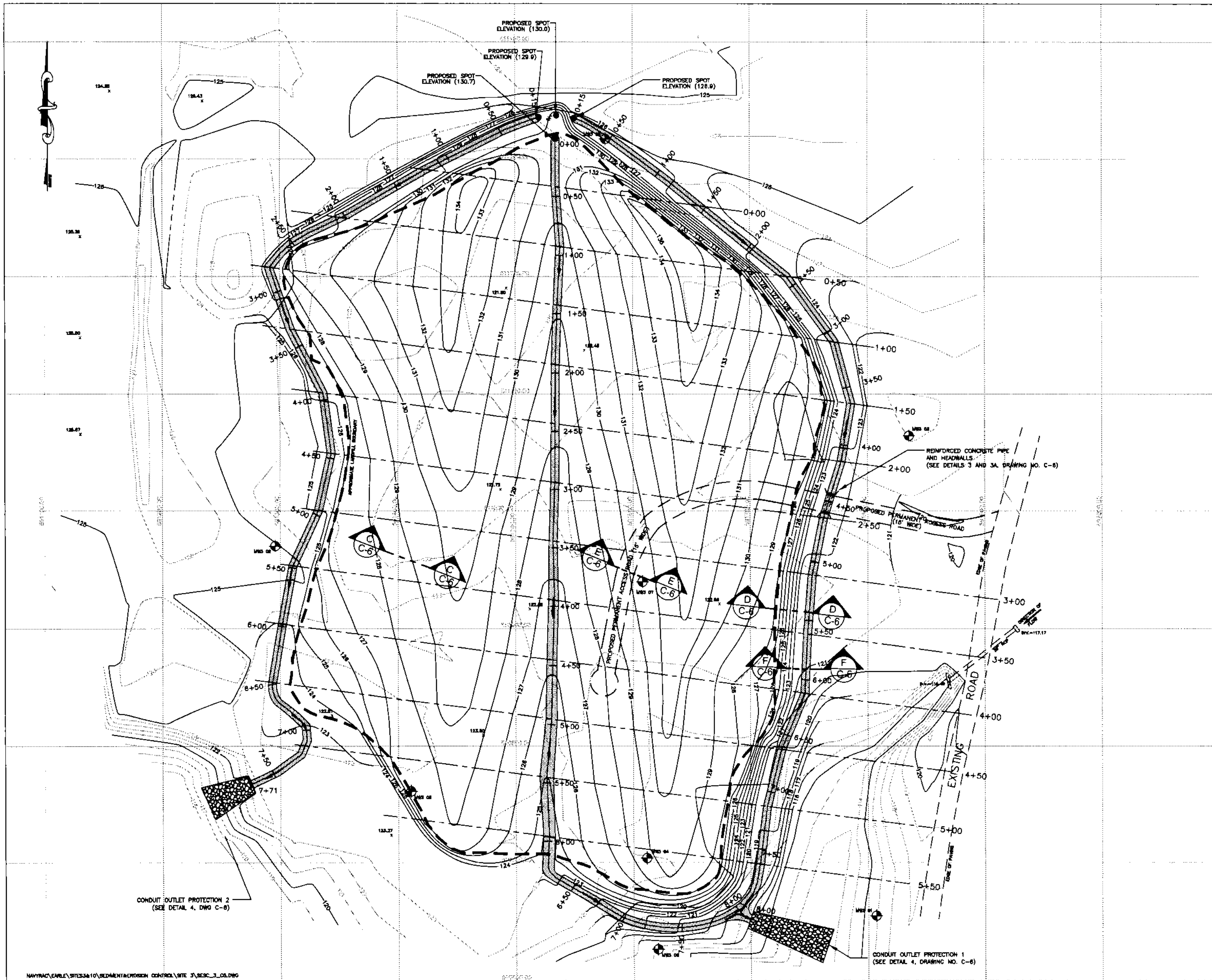
SCALE: 1"=40'

CONSTR. CONTR. NO. N62472-99-D-0032

SHEET 8 OF 8

SIZE: D

DWG. SH. NO. C-4



NOTES:

1. THE PROPOSED DRAINAGE SWALES SHALL HAVE MINIMUM SLOPE ALONG THEIR CENTERLINES AS SHOWN ON SHEET C-7.
2. THE CONTRACTOR SHALL MAINTAIN A MINIMUM DEPTH OF 1.6 FEET IN THE PROPOSED DRAINAGE SWALE.

LEGEND:

- EXISTING MONITORING WELL
- EXISTING SPOT ELEVATION
- APPROXIMATE LANDFILL BOUNDARY
- FINAL CONTOUR
- CROSS-SECTION LOCATION
- PROFILE STATION
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 7' WIDE DRAINAGE SWALE (TO BE CONSTRUCTED AT TOE OF SLOPE)
- FLOW DIRECTION
- RCP — EXISTING REINFORCED CONCRETE PIPE
- EXISTING ROAD
- PROPOSED ACCESS ROAD
- x 119.72 — DRAINAGE SWALE SPOT ELEVATION
- ● 130.7 — PROPOSED SPOT ELEVATION

SOURCE:

TOPOGRAPHIC PLAN – SITE NO. 3, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

FOSTER WHEELER ENVIRONMENTAL

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3
FINAL GRADING PLAN

KEITH BOGACKI, P.E.
NJPE NO. 40369

SAT TO | DATE 12/7/01

CODE I.D. NO.

SCALE: 1"=40'

SPEC. NO.

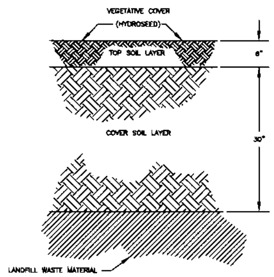
CONSTR. CONTR. NO. N62472-99-D-0032

NAVFAC DRAWING NO.

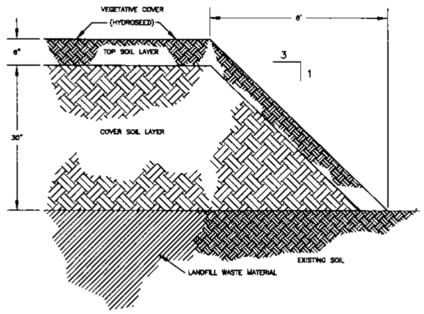
SHEET 6 OF 8

DES. SH. NO. C-5

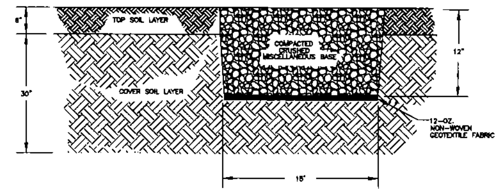
NAVYFAC\EARLE\SITES3&10\SEDIMENT&EROSION CONTROL\SITE 3\SESC_3_C5.DWG



SECTION C / C-5 SITE CAP SYSTEM
N.T.S. VEGETATED AREAS (TYP)



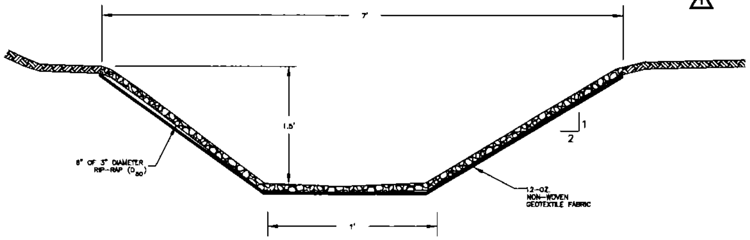
SECTION D / C-5 SITE CAP SYSTEM
N.T.S. CAP TOE DRAIN TERMINATION (TYP)



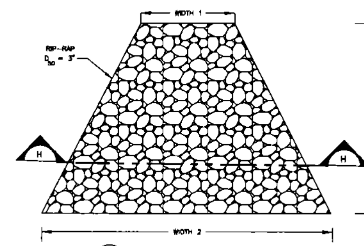
SECTION E / C-5 SITE ACCESS ROAD
N.T.S. WITHIN LANDFILL (TYP)

NOTE:

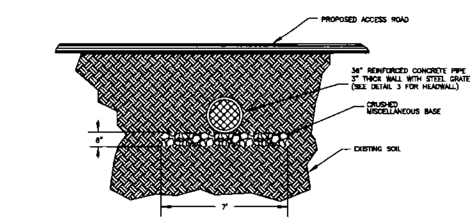
1. THE CONTRACTOR SHALL GRADE THE SIDE SLOPES OF THE DRAINAGE SWALES INTO THE RIP-RAP CONDUIT OUTLET PROTECTION. SIDE SLOPES OF THE DRAINAGE SWALES SHALL BE PROTECTED AGAINST EROSION AT THE CONDUIT OUTLET PROTECTION APRONS WITH 8 INCHES OF RIP-RAP.



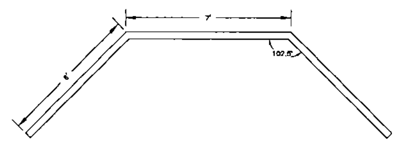
SECTION F / C-5 DRAINAGE SWALE (TYP)
N.T.S.



DETAIL 4 / C-5 CONDUIT OUTLET PROTECTION (TYP)
N.T.S. PLAN VIEW



DETAIL 3 / C-5 REINFORCED CONCRETE PIPE
N.T.S. BENEATH PROPOSED ACCESS ROAD



DETAIL 3A / C-5 HEADWALL
N.T.S. PLAN VIEW

NOTES:

1. HEADWALL TO BE CONSTRUCTED OF REINFORCED CONCRETE, 6" THICK, AND BE A MINIMUM OF 6' HIGH AND EMBEDDED A MINIMUM OF 1'.
2. THERE MUST BE A CLEARANCE HOLE FOR A 36" O.D. REINFORCED CONCRETE PIPE CENTRALLY LOCATED ON THE 7' SECTION WITH THE CENTER OF THE CLEARANCE HOLE 2"-3" FROM THE BOTTOM EDGE OF THE WALL.
3. TWO UNITS AS SHOWN ARE REQUIRED. FOR INSTALLATION LOCATIONS AND ELEVATIONS, SEE SHEET C-9.

	WIDTH 1	WIDTH 2	LENGTH	DEPTH
CONDUIT OUTLET PROTECTION 1	21'	30'	70'	8"
CONDUIT OUTLET PROTECTION 2	21'	30'	40'	8"

1 SECTION H CONDUIT OUTLET PROTECTION
N.T.S.

REV.	DESCRIPTION	PREP BY	DATE	APPRVD
1	SWALE LINING CHANGED FROM GRASS TO RIP-RAP			

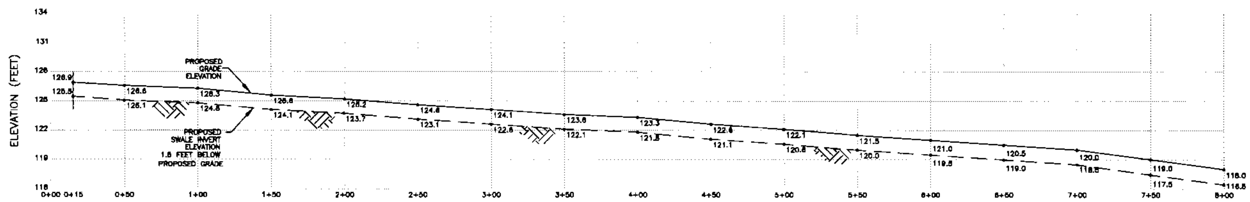
FOSTER WHEELER ENVIRONMENTAL

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
PENNSYLVANIA — NEW JERSEY

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 3
CAP CROSS-SECTIONS AND DETAILS AND STORMWATER MANAGEMENT DETAILS

KEITH BOGATCH, P.E.
NJPE NO. 40386
SAT TO — DATE 12/7/01
CODE I.D. NO.
SCALE: N.T.S.
SPEC. NO.
CONSTR. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET 7 OF 8
SIZE: D — DES. SH. NO. C-6

NAVYRAC\EARLE\SITES3&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_3_C6.DWG

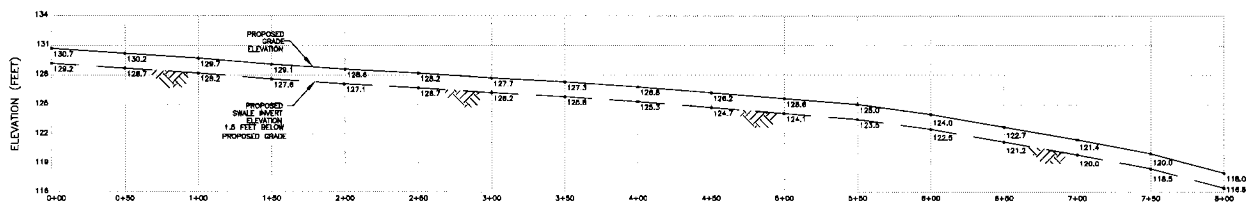


EASTERN DRAINAGE DITCH CENTERLINE (STATIONS)

SECTION (L / C-7) EASTERN DRAINAGE SWALE PROFILE
AS NOTED

SCALE: VERTICAL 1" = 6'
HORIZONTAL 1" = 40'

MAX. SLOPE: 2%
MIN. SLOPE: 0.6%

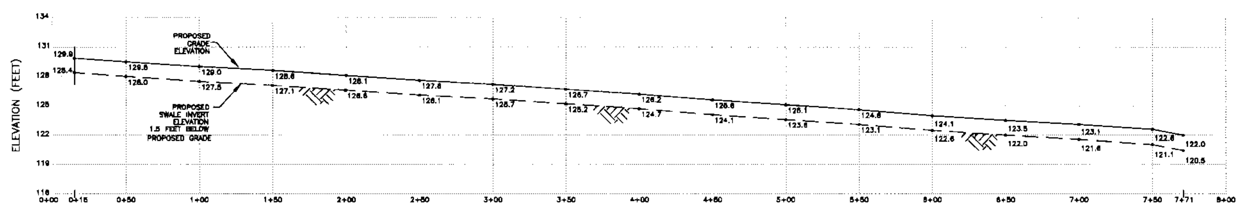


CENTRAL DRAINAGE DITCH CENTERLINE (STATIONS)

SECTION (M / C-7) CENTRAL DRAINAGE SWALE PROFILE
AS NOTED

SCALE: VERTICAL 1" = 6'
HORIZONTAL 1" = 40'

MAX. SLOPE: 4%
MIN. SLOPE: 0.8%



WESTERN DRAINAGE SWALE CENTERLINE (STATIONS)

SECTION (N / C-7) WESTERN DRAINAGE SWALE PROFILE
AS NOTED

SCALE: VERTICAL 1" = 6'
HORIZONTAL 1" = 40'

MAX. SLOPE: 1.2%
MIN. SLOPE: 0.8%

FOSTER WHEELER ENVIRONMENTAL

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 3
SWALE PROFILES

DATE 12/7/01
CODE I.D. NO. 80091
SCALE: AS NOTED
CONSTR. CONTR. NO. N62472-99-D-0032
SHEET 8 OF 8
SIZE D
DR. SH. NO. C-7

NAVFAC\EARLE\SITE3&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_3_C7.DWG

Prepare in quintuplicate (original and 4 copies)

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
NORTHNAVFACENGCOM 4335/3 (Rev. 6/80)

CONTROL NO. 002A

CONTRACT NO.	DELIVERY ORDER #	ACTIVITY LOCATION
N62472-99-D-0032	**0040**	**NWS Earle, Colts Neck, New Jersey**

PROJECT TITLE:
Landfill Capping OU-6, Sites 3 & 10

FROM:	DATE
Foster Wheeler Environmental Corp. – Program QCM: Mark Miller	August 21, 2001
TO:	DATE
C. Davis (1copy)	August 21, 2001

1. THE CONTRACTOR SUBMITTALS LISTED BELOW ARE FORWARDED FOR YOUR REVIEW AND RECOMMENDATIONS.
   (a) APPLY APPROPRIATE STAMP IMPRINT TO EACH SUBMITTAL AND INDICATE REVIEW COMMENTS, AS REQUIRED.
   (b) RETAIN ONE (1) COPY OF THIS TRANSMITTAL FORM AND RETURN REMAINING COPIES WITH REVIEWED SUBMITTALS TO ROICC.
2. THESE SUBMITTALS SHOULD BE RETURNED TO THIS OFFICE BY _____
3. NO RESPONSE REQUIRED_____

COPY TO:

[x] G. GOEPFERT (1 COPY) [X] J. KOLICIUS (2 COPIES [X] FREEHOLD SOIL CONSERVATION DISTRICT (4 COPIES)

8/21/2001
SIGNATURE AND DATE

FROM: DESIGNER	DATE
TO: ROICC	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE RETURNED, WITH ACTION TAKEN AS INDICATED.
2. _____

COPY TO:

[ ] ROICC [ ] DESIGNER

SIGNATURE AND DATE

FROM: ROICC	DATE
TO: CONTRACTOR	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE APPROVED/DISAPPROVED AS SHOWN BELOW AND ON EACH STAMP IMPRINT.

COPY TO:
[ ] ROICC [ ] OTHER

FOR COMMANDING OFFICER, ENGINEERING FIELD ACTIVITY – NORTHEAST, NAVAL FACILITIES ENGINEERING COMMAND — DATE

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
2	SD-08, Statements; Soil Erosion and Sediment Control Plan Report – Site 3	R. Woodworth			Submittal includes: Report & Drawings

SOIL EROSION AND SEDIMENT CONTROL PLAN REPORT

- FOR -

Naval Weapons Station Earle – Site 3
Colts Neck, Monmouth County, New Jersey

Submitted by:

Department of the Navy
Engineering Field Activity, Northeast
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania

Prepared by:

Foster Wheeler Environmental Corporation
2300 Lincoln Highway East
One Oxford Valley, Suite 200
Langhorne, Pennsylvania 19047-1829

AUGUST 20, 2001

FOSTER WHEELER ENVIRONMENTAL CORPORATION
KEITH J. BOGATCH, PE
NJPE NO. 40369

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1.0 INTRODUCTION

Foster Wheeler Environmental Corporation (FWENC) has been retained by the Department of the Navy, under Contract Task Order N62472-99-D-0032 CTO No. 40, to prepare a Soil Erosion and Sediment Control Plan for the remedial actions to be conducted at Site 3 of the Navy Weapons Station (NWS) Earle. This Soil Erosion and Sediment Control Plan Report (hereinafter referred to as the "SESC Plan Report") has been prepared for the capping of a former landfill located on Site 3. The closure of the Site 3 landfill is being performed in accordance with the approved closure plan and a Record of Decision (ROD) with the United States Environmental Protection Agency (USEPA) for this site.

1.1 Background

The NWS Earle, commissioned in 1943 to supply ammunition to the naval fleet, is located in Monmouth County, New Jersey approximately 47 miles south of New York City. The location of the NWS Earle is depicted on Figure 1, included in Appendix A of this report. The NWS Earle consists of two areas (i.e., the Mainside Area and the Waterfront Area), which are interconnected via a Navy-controlled right-of-way and access road.

The Mainside Area is located in Colts Neck Township, Monmouth County, New Jersey. Site 3 (hereinafter referred to as the "subject site") is located in the Mainside Area. The location of Site 3 is depicted on Figure 2 included in Appendix A of this report.

The subject site encompasses an area of approximately five (5) acres that is reported to have been utilized from 1960 to 1968 for the disposal of domestic and industrial wastes. As stated in a document entitled Proposed Plan for Site 3 and 10 (OU-6), Naval Weapons Station Earle, Colts Neck, New Jersey dated May 2001 and prepared by Tetra Tech Nus, Inc., the industrial wastes are reported to have included paints and paint thinners, solvents, varnishes, shellac, acids, alcohols, caustics, pesticide containers and rinse water, wood, and small amounts of asbestos. Navy records, reviewed as part of the performance of an Initial Assessment Study (IAS) in 1982, indicate that the industrial wastes comprise only a small portion of the approximately 4,800 tons of waste that were deposited in this landfill area. Test pits performed at the subject site in 1995 confirmed the findings of the IAS and noted the presence of aged municipal trash including plastic, wood, newspaper, rusted tin cans, oil filters, empty antifreeze bottles, and glass bottles. The municipal trash was noted to be present within two feet of the ground surface. Sandy soils were utilized as cover material over the landfill wastes.

Evidence has also been found that the subject site area had been used for shotgun target practice during some unknown time period. Laboratory analysis of surface soil and sediment samples did not reveal the presence of lead at concentrations that would indicate a significant impact from this activity has occurred.

A description of the on-site soils is presented in Section 3.0 of this SESC Plan Report. The site is currently vegetated with grasses and scrub pines, with the exception of the access road and an open, disturbed, vehicle turn-around area, where no vegetation exists. Since cessation of disposal activities at this site, the sandy soil cover has eroded and portions of the landfill contents have been uncovered.

In 1990, the NWS Earle was placed on the USEPA's National Priorities List (NPL). Several rounds of assessment (human health risks, ecological risks) and investigation (site, remedial, etc.) activities were conducted at the station. Site 3, along with another landfill site (i.e., Site 10) was grouped together, due to similar characteristics into a single operable unit, Operable Unit Six (OU-6). Based on the results of these assessments, investigations and the objective to protect human health and the environment, remedial alternatives to address Site 3 were developed and assessed. A summary of the assessments, investigations and remedial alternative analyses is presented in a document entitled Proposed Plan for Site 3 and 10 (OU-6), Naval Weapons Station Earle, Colts Neck, New Jersey dated May 2001 and prepared by Tetra Tech Nus, Inc.

Based on analysis of the remedial alternatives developed for Site 3, the Department of the Navy, in accordance with the USEPA and the New Jersey Department of Environmental Protection (NJDEP), selected a remedial alternative consisting of the capping of the landfill, the erection of a cable-type wire fence with appropriate warning signs, the establishment of institutional controls (i.e., restrictions attached to the Station Master Plan to limit future use and disturbance of the landfill) and the long term monitoring and maintenance of the landfill surface. The construction of the cap over the landfill area as well as the erection of the cable-type wire fence will act as containment measures serve to restrict human access to the wastes in the landfill area. The institutional controls would limit exposure to the landfills contents.

1.2 SESC Plan Organization

This SESC Plan provides the basis for the establishment of soil erosion and sediment control measures to be implemented at the subjects site during the construction of the chosen remedial alternative (i.e., landfill cap). The SESC Plan describes the proposed measures and procedure for controlling soil erosion at the subject site. The SESC Plan contains the following sections:

- Section 1.0 – INTRODUCTION: This section provides a brief summary of the subject site and the history of the landfill located on same.
- Section 2.0 – PROJECT DESCRIPTION: This section provides a brief description of the remedial activities (i.e., construction activities) to be implemented at the on-site landfill.
- Section 3.0 – EXISTING SITE CONDITIONS: This section of the Soil Erosion and Sediment Control Plan Report details the current conditions at the subject site including a description of the on-site soils and the existing drainage areas.
- Section 4.0 – PROPOSED SITE CONDITIONS: This section of the Soil Erosion and Sediment Control Plan Report details the conditions of the site, including newly established drainage areas, after the construction of the proposed remedial actions (i.e., capping of the on-site landfill).
- Section 5.0 – DRAINAGE AREA COMPARISON (EXISTING VERSUS PROPOSED PEAK FLOWS): This section of the Soil Erosion and Sediment Control Plan Report discusses the comparison of the existing peak flows in each drainage area with the proposed peak flows established after construction of the proposed project. This section also include the rationale for the proposed stabilization methods to be employed to prevent adverse affects to the site and off-site areas from erosional effects.

- Section 6.0 – PROPOSED SOIL EROSION AND SEDIMENT CONTROL MEASURES): This section of the Soil Erosion and Sediment Control Plan Report discusses the proposed soil erosion and sediment control (temporary and permanent) measures to be implemented at the site during the construction activities to prevent adverse effects from erosional forces (i.e., wind, water, etc.).

- Section 7.0 – PROPOSED SEQUENCE OF CONSTRUCTION: This section of the Soil Erosion and Sediment Control Plan Report presents the proposed sequence of construction activities, as well as their durations, to be implemented at the subject site.

- Section 8.0 – REFERENCES: This section of the Soil Erosion and Sediment Control Plan Report presents the references to publications utilized during the preparation of this Soil Erosion and Sediment Control Plan Report as well as the associated Soil Erosion and Sediment Control Plans.

1.3 SESC Plan Preparation

This SESC Plan is being submitted to satisfy the substantive portions of the Standards for Soil Erosion and Sediment Control in New Jersey, adopted July 1999 and the Soil Erosion and Sediment Control Act of 1975 as amended (N.J.S.A. 4:24-39 et. Seq.) and the New Jersey Administrative Code (N.J.A.C. 2:90-1.1 et. seq.)

2.0 PROJECT DESCRIPTION

As previously stated, based on the results of several rounds of assessment, investigation and analysis performed by the Navy, a remedial alternative as stated in the Record of Decision consists of the capping of the existing landfill, construction of a cable-type fence surrounding same, establishment of institutional controls and long term monitoring of the cap has been developed to address the closure of the landfill. The landfill cap will serve to prevent potential human and wildlife contact with the landfill materials, reduce contaminant leaching to groundwater and limit contaminant migration via surface runoff and erosion as stated in the May 2001 Document.

In addition, the perimeter of the landfill will be fenced and warning signs will be posted to limit access to the covered area. Land use restrictions will be placed to limit future uses and development of the site that may result in disturbance of the soil cover or direct contact with contaminated media. These land use restrictions will also prohibit the use of untreated groundwater as drinking water.

The landfill cap design consists of a thirty inch (30") layer of cover soil to be placed over the graded existing soils/wastes. A six inch (6") layer of top soil will be placed over this soil cover layer. The topsoil layer will be hydroseeded to establish permanent vegetative cover.

The cap system consists of an inverted type soil cap. As illustrated on Drawing C-5 of the Soil Erosion and Sediment Control Plans, this type of capping system divides the landfill area into four quadrants. The eastern and western quadrants of the landfill area are sloped towards the eastern and western exteriors of the landfill. A continuous perimeter drainage swale will be constructed around the entire extent of the landfill to collect and transfer stormwater run-off to the existing low lying areas along the southeastern and southwestern corners of the landfill area.

The two interior quadrants are sloped to the center of the landfill area. An interior drainage swale is proposed to be constructed at the base of this slope to collect stormwater runoff from these interior quadrants. The interior swale will serve to collect and transfer stormwater runoff in this area to the low lying areas along the southeastern corner of the landfill area.

3.0 EXISTING SITE CONDITIONS

The former landfill located on the subject site encompasses and area of approximately five (5) acres. The aerial extent of the landfill was determined through the performance of a soil boring program performed by FWENC during site investigation activities in June 2001. The limits of the landfill are shown on a site plan, Figure 3, included in Appendix A of this report.

The subject site is generally bounded to the north, south and west by wooded areas. The eastern side of the subject site is bounded by an existing unnamed road. The areas further to the east, beyond this existing road, consist of undeveloped woodlands. Visual reconnaissance of the subject site notes same to generally slope from north to south. Low lying depressed land areas (i.e., land areas located at a lower elevation than its surrounding areas) are located in the southeastern and southwestern corners of the subject site, outside of the existing landfill limits. Currently, stormwater runoff on the subject site appears to follow the general topography of the subject site and flows in a north to south direction to these low lying areas. The low lying areas appear to collect site stormwater runoff which is directed, via topography, to the undeveloped wooded areas located to the south of the subject site.

A single, thirty-six inch (36"), reinforced concrete stormwater drainage pipe is located in the southeastern corner of the subject site. The location of this pipe is depicted on Figure 3 included in Appendix A of this SESC Plan Report as well as Drawing C-3 of the Soil Erosion and Sediment Control Plans. The pipe extends underneath the existing road to the east of the subject site. Based on a topographic survey of the inverts of the pipe, the pipe collects stormwater from the undeveloped and wooded areas located to the east of the existing road and transfers same, under the existing road, onto the subject site. Stormwater discharge from this pipe empties into the low lying areas located to the southeast of the landfill area. This flow, along with existing site stormwater flow, is directed topographically to the undeveloped wooded areas located to the south of the subject site.

3.1 Critical Areas

Critical areas are those that pose potentially serious soil erosion problems due to the presence of steep slopes, poor vegetative cover or potentially high surface water velocities. Currently, no potentially critical areas are noted to exist on the subject site.

3.2 Wetlands

A site reconnaissance was performed by a representative of FWENC on June 6, 2001 to confirm the presence/absence of wetland areas within the site limits. Field conditions at the time of the site reconnaissance noted the site to consist primarily of a forested area over sandy fill materials. Vegetation on the site was noted to consist of pitch pines, red oak species, black cherry saplings and black huckleberrys. The on-site soils were determined not to be hydrophytic. Soils were noted to consist of a grayish brown sandy surface layer over yellowish brown sand and were determined to be non-hydric. No evidence of wetland hydrology was observed within the limits of Site3. Therefore, Site 3 was determined to be non-wetland.

3.3 Flood Plains

Based on review of available information as well as data gained during site investigation/site reconnaissance activities, no portions of Site 3 are located within the 100-year flood plain area.

3.4 On-Site Soils

Review of the Soil Survey of Monmouth County, New Jersey dated 1989, as prepared by the United States Department of Agriculture (USDA), Soil Conservation Service, notes the presence of a single soil series (i.e., the Lakehurst series) to be underlying the subject site. The limits of this soil series, as it appears on the subject site, is depicted on a site plan, Figure 4, included in Appendix A of this SESC Plan Report.

The Lakehurst series soils, mapped as Lakehurst sand are nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Typically, the surface layer is gray sand 4 inches thick. The subsurface layer is light gray sand 6 inches thick. The subsoil is 26 inches thick. It is brown loamy sand to a depth of 13 inches. In the next layer it is mottled, brownish yellow sand to a depth of 24 inches. Below that, it is mottled, pale brown sand to a depth of 36 inches. The substratum is mottled, light brownish gray sand to a depth of 60 inches or more. Permeability of this Lakehurst soil is rapid in the subsoil and the substratum. The available water capacity is low. The apparent seasonal high water table depth of 1 ½ to 3 ½ feet from January to April. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Most areas of this soil consist of woodlands. A very small acreage is used for pasture and farming. This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, rapid permeability, and the seasonal high water table. The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, cutbanks caving, and sandiness.

3.5 Existing On-Site Drainage Areas

Based on review of topographical maps, site surveys and other information concerning the subject site, it appears that with the exception of the aforementioned 36" diameter stormwater drainage pipe, the site is isolated from off-site drainage flow patterns. The site is bounded to the north and west by natural drainage divides (i.e., mounded areas) which would prevent stormwater run-on from the undeveloped wooded areas to the north and west to the subject site. The existing road to the east of the site serves to prevent stormwater run-on from area to the east of the subject site. The general topography of the subject site (i.e., sloping from north to south) prevents stormwater run-on from the undeveloped wooded areas located to the south of the subject site.

Based on the existing topography of the subject site, the site consists primarily of two drainage areas that generally divide the site into eastern and western portions. The first drainage area (i.e., EDA-1) is located in the eastern portion of the site and includes the stormwater flow from the eastern portion of the existing landfill as well as the flow transferred through the existing 36" reinforced concrete pipe (RCP). Overland stormwater flow from the landfill area is directed to the southeastern corner of the subject site (located to the southeast of the landfill limits). Stormwater collected in this low lying area is directed, via land topography, in a southeasterly

direction and joins the flow from the single 36" RCP. At this point, the stormwater flow combines with other overland flow and is directed, via existing topography, to the undeveloped wooded areas located to the southeast of the subject site. EDA-1 encompasses an area of approximately 290,319 square feet (sq. ft.).

The second drainage area (i.e., EDA-2) is located in the western portion of the subject site and includes the stormwater flow from western portion of the existing landfill. Flow in this drainage area is directed, in a southwesterly direction, via existing land topography, to the undeveloped wooded areas located to the southwest of the subject site. EDA-2 encompasses an area of approximately 211,968 sq. ft.

The approximate limits of the two existing drainage areas (i.e., EDA-1 and EDA-2) as well as their associated discharge points (Q_1 and Q_2, utilized in the stormwater management calculations) are depicted on a site plan, Figure 5, included in Appendix A of this report.

3.6 Existing On-Site Peak Flows

Utilizing the existing drainage area information, the existing conditions located on the site and the USDA, National Resource Conservation Service, Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55), the peak discharge flows for each drainage areas were calculated. The flows were calculated utilizing the two (2), ten (10) and twenty-five (25) year storm events. The following table summarize the peak flows in each drainage area for each of the storm events.

Drainage Area Number	Acreage (sq. ft.)	Peak Flows (cubic feet per second (cfs))		
		Two Year Storm	Ten Year Storm	Twenty-Five Year Storm
EDA-1 (*)	290,319	65.75	69.65	71.69
EDA-2	211,968	1.68	4.66	6.11

* Drainage area EDA-1 includes the maximum stormwater flow from the aforementioned 36" stormwater pipe (i.e., the pipe flowing full).

Please note, all calculations performed to develop these flows including TR-55 Worksheet 2: Runoff Curve Numbers and Runoff, Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t) and Worksheet 4: Graphical Peak Discharge Method are included in Appendix B of this SESC Plan. In addition, the calculation regarding the 36" stormwater pipe, which directs stormwater onto the subject site, is included in Appendix B. It should be noted, for the purposes of calculating the flow from this pipe, the pipe was considered to be flowing full which would be the worst case scenario in any storm event that could be realized from the pipe.

4.0 PROPOSED SITE CONDITIONS

Implementation of the proposed remedial actions (i.e., capping of the landfill site) will result in the clearing and grubbing of existing vegetation, the installation of soil coverings not indigenous to the subject site (i.e., placement of common fill, top soil and the establishment of permanent vegetative cover) and the establishment of new drainage areas. The proposed grading of the subject site after the construction of the soil cap and associated stormwater swales in shown on Drawing C-5 of the Soil Erosion and Sediment Control Plan.

4.1 Critical Areas

The implementation of the proposed remedial actions will create two new critical areas located at the discharge points of the drainage swales. Conduit outlet protection consisting of horizontal rip-rap aprons has been designed to prevent erosion problems stemming from these discharges. A discussion of the design of the aprons is presented in Section 6.5 of this SESC Plan Report. Details of the apron design are also presented on Sheet C-6 of the Soil Erosion and Sediment Control Plans.

4.2 Proposed On-Site Drainage Areas

Based on proposed topography for the subject site, the site will be divided into a total of three drainage areas. The limits of the three drainage areas (i.e., PDA-1, PDA-2 and PDA-3) are depicted on a site plan, Figure 6, included in Appendix A of this report.

Generally, stormwater flow from drainage areas PDA-1 and PDA-2 will be collected in perimeter swales and directed to the low lying areas located in the southeastern and southwestern corners of the subject site, similar to the existing site conditions. Stormwater from drainage area PDA-3 (i.e., the interior drainage area) will be collected in the interior drainage swale. The interior drainage swale will flow in a north-south direction to the southern limit of the landfill area. From this point, the swale will flow in a southeastern direction and join with the flow from drainage area PDA-1 and its associated swale. At this point, the combined flow will discharge into the low lying area located in the southeastern corner of the subject site.

The drainage swales are proposed to be constructed with trapezoidal sections. The section is proposed to have a base width of two feet (2') with side slopes of 3H:1V. Based on the stormwater calculations performed, the swales will have a design depth of two feet (2'). The design slope will be 1%. Details of the construction of the swales are shown on Drawing C-6 of the Soil Erosion and Sediment Control Plans.

It should be noted, a depiction of the approximate limits of the proposed drainage areas (PDA-1 through PDA-3) as well as the locations of the proposed interior and exterior drainage swales and their associated discharge points are shown on Figure 6, included in Appendix A of this SESC Plan Report as well as Drawings C-4 and C-5 of the Soil Erosion and Sediment Control Plans.

4.3 Proposed On-Site Peak Flows

Utilizing the proposed conditions drainage area information, the proposed conditions located on the site and the USDA, National Resource Conservation Service, Urban Hydrology for Small

Watersheds, Technical Release 55 (TR-55), the peak discharge flows for each of the proposed drainage areas were calculated. The flows were calculated utilizing the two (2), ten (10) and twenty-five (25) year storm events. The following table summarizes the peak flows in each drainage area for each of the storm events.

Drainage Area Number	Acreage (sq. ft.)	Peak Flows (cubic feet per second (cfs))		
		Two Year Storm	Ten Year Storm	Twenty-Five Year Storm
PDA-1 (*)	198,654	65.00	67.72	69.31
PDA-2	180,489	1.39	4.01	5.43
PDA-3	133,182	0.84	2.89	3.95

* Drainage area PDA-1 includes the maximum stormwater flow from the aforementioned 36" stormwater pipe (i.e., the pipe flowing full).

Please note, all calculations performed to develop the proposed peak discharges including TR-55 Worksheet 2: Runoff Curve Numbers and Runoff, Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t) and Worksheet 4: Graphical Peak Discharge Method are included in Appendix B of this SESC Plan.

5.0 DRAINAGE AREA COMPARISON (EXISTING VERSUS PROPOSED PEAK FLOWS)

To determine the need for stabilization of the three on-site drainage areas and the two discharge points (PDA-1 and PDA-3 discharge to the same point) and their associated land depressions, a comparison of the existing versus proposed conditions was performed. Based on the information presented in Sections 3.0 and 4.0 of this report, the peak flows calculated for the existing site conditions in each of the three on-site drainage areas, is equal to or exceeds the peak flow in the same drainage areas during the proposed conditions. The following table summarizes this comparison.

Drainage Area Number	Acreage (sq. ft.)	Peak Flows (cubic feet per second (cfs))		
		Two Year Storm	Ten Year Storm	Twenty-Five Year Storm
EDA-1/ PDA-1+PDA-3 (*)	290,319 / 331,836	65.75 / 65.84	69.65 / 70.61	71.69 / 73.26
EDA-2 / PDA-2	211,968 / 180,489	1.68 / 1.39	4.66 / 4.01	6.11 / 5.43

(*) The flows from drainage areas PDA-1 and PDA-3 are collected by separate stormwater drainage swales. These flows ultimately combine in a single discharge point located in the southeastern corner of the subject site.

As shown in the above table, a comparison of the peak flows under the existing conditions with the peak flows under the proposed site conditions reveals basically no change in the peak flows to the two site discharge points. The first site discharge point (i.e., Q_1) is subject to flows from existing drainage area EDA-1 of 65.75 cfs, 69.65 cfs and 71.69 cfs, respectively during the two, ten and twenty-five year storms. Under the proposed conditions, this discharge point will be subject to a combined flow from proposed drainage areas PDA-1 and PDA-3 of 65.84 cfs, 70.61 cfs and 73.26 cfs, respectively during the two, ten and twenty-five year storms. The change in site conditions will represent a 0.014%, 1.36% and 2.1% during the two, ten and twenty-five year storms. These percentages represent an insignificant change in site flows between the existing and proposed site conditions. Further, it should be noted, all areas located downgradient of Site 3 that will be subject to this insignificant increase in stormwater flow, consist of undeveloped wooded areas owned by the Department of the Navy.

The second site discharge point (i.e., Q_2) is subject to flows from existing drainage area EDA-2 of 1.68 cfs, 4.66 cfs and 6.11 cfs, respectively during the two, ten and twenty-five year storms. Under the proposed conditions, this discharge point will be subject to flows of from proposed drainage area PDA-2 of 1.39 cfs, 4.01 cfs and 5.43 cfs, respectively during the two, ten and

twenty-five year storms. Comparing the existing and proposed conditions notes that the construction of the proposed soil cap will decrease the off-site flows at this discharge point.

Based on the above, it does not appear that the use of any stormwater management basins are necessary to control the rate of stormwater flow from the site. Further, based on the comparison of the existing and proposed peak flows, no enhancements of the low lying areas or downstream points are warranted.

However, based on the fact that the implementation of the proposed remedial alternative will disturb a land area in excess of 5,000 sq. ft. and that the proposed site conditions will concentrate the flow at the two site discharge points (Q_1 and Q_2), soil erosion and sediment control measures, as per the Standard for Soil Erosion in New Jersey dated July 1999, will be employed during the construction and maintenance activities. These soil erosion and sediment control measures are discussed in the following section of this report and detailed on the Soil Erosion and Sediment Control Plans.

6.0 PROPOSED SOIL EROSION AND SEDIMENT CONTROL MEASURES

Based on the need to minimize soil erosion during the implementation of the project as well as in the long term, the following soil erosion and sediment control measures will be utilized. It should be noted, the locations of the various erosion control measures are depicted on the attached Soil Erosion and Sediment Control Plans.

6.1 Temporary Vegetative Cover for Soil Stabilization

To minimize erosional (wind, water, etc.) effects during the implementation of the proposed remedial actions, all soils exposed for periods of two (2) to six (6) months, not subject to grading, construction activities or scheduled for permanent seeding, will be temporarily seeded until permanent stabilization can be established. Temporary seeding activities will be conducted as per Standard 7-1 of the Soil Erosion and Sediment Control Standards (July 1999) as well as per the Temporary Seeding specifications on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.2 Permanent Vegetative Cover for Soil Stabilization

As previously indicated, the establishment of permanent vegetative covers is the final component of the proposed landfill cap. Permanent seeding will be performed as per Standard 4-1 of the Soil Erosion and Sediment Control Standard in New Jersey dated July 1999 and as per the notes and details on Drawing C-2 of the Soil Erosion and Sediment Control Plans. However, it should be noted that the Department of the Navy maintains their own specification regarding seed mixtures for permanent seeding. This mixture is presented on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.3 Top Soil

As previously stated, the final layer of the proposed landfill cap will consist of a six (6) inch layer of top soil. The top soil will be placed and permanently seeded as per the technical specification for the project, all applicable sections of the Standard for Soil Erosion and Sediment Control in New Jersey and the notes and details presented on the Soil Erosion and Sediment Control Plans for this project.

6.4 Channel Stabilization

As previously stated, the implementation of the proposed project includes the construction of two perimeter (eastern and western) swales and one interior drainage swale. These swales will have a trapezoidal section with a base of two feet (2'), side slopes of 3:1 and a depth of two feet (2').

TR-55 and other stormwater calculations were performed to size the swales based on the peak flows generated from the stormwater calculations in the drainage areas. These calculations are included in Appendix B of this SESC Plan Report. Based on these calculations, it was determined that a maximum peak flow of 9.80 cfs ($Q_1 + Q_3$) would be realized in the swales (i.e., the eastern perimeter swale) during a twenty-five (25) year

storm event. Utilizing this flow and the cross sectional area of the swale (i.e., sixteen (16) square feet), the maximum velocity in the swale would be 0.62 feet/second (ft/s).

Utilizing Table 11-1 of the Standards for Soil Erosion and Sediment Control in New Jersey, the maximum allowable velocity for sand type soils is 1.8 ft/s. This value also represents the most conservative velocity. As the maximum velocity which would be realized in the proposed swales is 0.62 ft/s and Standard 11-1 allows for a permissible velocity of 1.8 ft/s, it does not appear that any of the three swales will require any additional stabilization measures besides the permanent seeding of same.

6.5 Conduit Outlet Protection

As previously stated in this SESC Plan Report, the three stormwater swales to be constructed on the subject site will discharge to low lying areas, located on the southeastern and southwestern corners of the site, via two discharge points (i.e., Q_1 and Q_2). In order to protect these discharge points from erosional forces, the two discharge points will be equipped with conduit outlet protection. The conduit outlet protection will consist of horizontal aprons constructed of rip-rap with a D_{50} size of three inches (3"). The thickness of the aprons will be nine inches (9") for the Q_1 discharge point and six inches (6") for the Q_2 discharge point. Calculations associated with the sizing of the horizontal aprons are included in Appendix A of this SESC Plan Report. Details concerning the size and construction of the aprons are shown on Drawing C-6 of the Soil Erosion and Sediment Control Plans.

6.6 Dust Control

As stated in the Standards for Soil Erosion and Sediment Control in New Jersey, dated July 1999, to prevent blowing and movement of dust from exposed soil surfaces and to reduce on-site and off-site damage and health hazards during construction activities, dust control methods will be utilized as per Standard 16-1. The Contractor will be required to implement one or more of the dust control methods as per the notes on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.7 Grassed Waterway

As previously stated, three drainage swales are proposed to be constructed at the subject site to collect stormwater runoff from the landfill area and direct same to the low lying areas in the southeastern and southwestern corners of the subject site. The design of these swales satisfied the substantive portions of the Grassed Waterway Standard. The swales will have trapezoidal sections and be subject to permanent seeding as per the Standard for Permanent Vegetative Cover for Soil Stabilization (Standard 4-1). The swales will have a base dimension of two feet (2') and side slopes of 3:1. Based on the design depth of two feet (2'), the top width of the waterway will be fourteen feet (14') which exceeds the minimum width of ten feet (10'). Based on the maximum velocity that will be realized in the swale (0.62 ft/s as discussed in Section 6.4 of this report), the swale design satisfies the maximum allowable velocities for grassed waterways as specified in Table 18-1 (i.e., maximum of 2.0 ft/s in sand soils).

6.8 Silt Fence

Silt fencing will be installed along the perimeter of the site immediately adjacent to the limits of disturbance as shown on Drawing C-4 of the attached Soil Erosion and Sediment Control Plan. The fencing will be installed in order to intercept runoff from the disturbed areas and prevent silt from migrating off-site with same. The silt fence will be installed prior to any clearing, grubbing, or excavation activities at the site. The silt fence will be installed as per Standard 25-1 as well as the notes and details presented on Drawing C-2.

6.9 Stabilized Construction Accessway

Access to the subject site is via a dirt road extending from the existing road located to the east of the subject site. The location of this access road is depicted on Figure 3 included in Appendix A of this report. As such, to reduce tracking or flowing of sediment onto the existing road, a stabilized construction accessway will be constructed at the site entrance. The accessway will be constructed as per Standard 29-1 and the notes and details on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.10 Decontamination Pad

A decontamination pad will be constructed adjacent to the stabilized construction accessway. The pad will be of similar construction to the stabilized construction accessway and will be utilized to remove all soils and sediments from site vehicles prior to same exiting the site. A detail noting the construction of the proposed decontamination pad is included in Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.11 Best Management Practices

The following management practices will be applied throughout the construction activities:

1. Unstabilized, disturbed areas will be minimized and construction activities will be staged.
2. Seeding or other stabilization measures will follow immediately after grading.
3. Areas, which are not to be disturbed, will be clearly marked by flags, signs, etc.
4. The Navy's Contracting Officer will be responsible for ensuring the installation and maintenance of all soil erosion and sediment control practices.
5. Erosion and sediment control structures will be installed and/or constructed prior to the start of any earth disturbing activities.
6. Erosion and sediment control structures will remain in place until permanent vegetation has become established over disturbed surface.

6.12 Maintenance of Soil Erosion and Sediment

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall event. Any required repairs will be made immediately. The following items will be checked in particular:

- The stabilized construction accessway and the decontamination pad will be maintained in a condition, including the addition of stone or other repairs, which will minimize tacking of sediment onto roads.
- The silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition reaches half of the height of the fabric.
- All seeded areas will be checked regularly to ensure that a good stand is maintained. Areas shall be fertilized, additional top soil placed and re-seeded as needed.

7.0 SEQUENCE OF CONSTRUCTION

The proposed Sequence of Construction is detailed in the following table as well as on Drawing C-1 of the Soil Erosion and Sediment Control Plan:

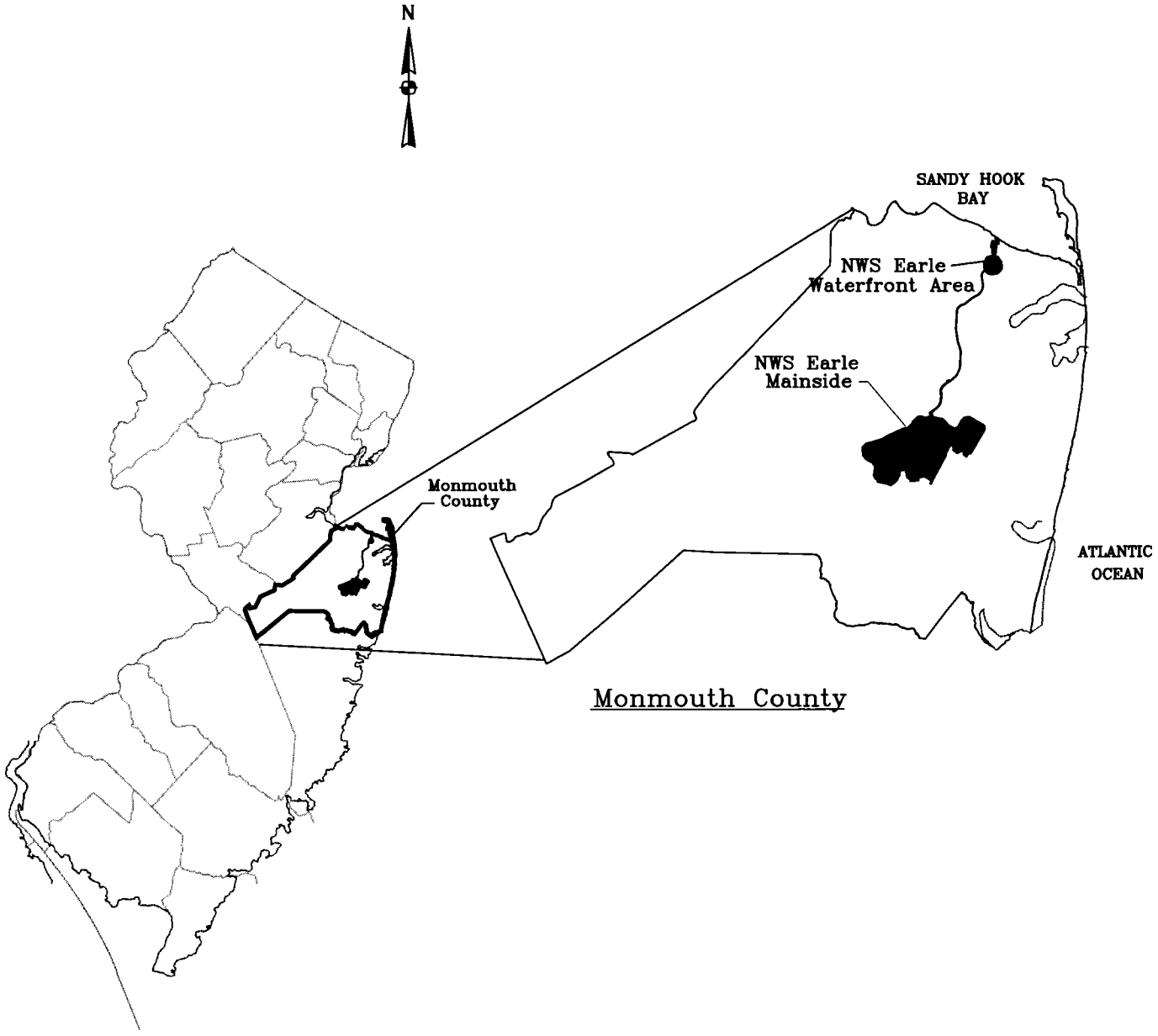
Task		Duration (Working Days)
(1)	Mobilize Site	5
(2)	Sweep of Work Area for Unexploded Ordinances	5
(3)	Install Soil Erosion and Sediment Control Measures	10
(4)	Clearing and Grubbing of Site within Limits of Disturbance	5
(5)	Perform Test Pit Operations/Conduct Site Survey	10
(6)	Construct/Stabilize Temporary Site Access Roads	5
(7)	Place and Grade Subgrade	10
(8)	Construct Landfill Cap	20
(9)	Construct Permanent Security Fencing	5
(10)	Seed Site/Conduct Final Site Survey	10
(11)	Demobilize Site / Remove Soil Erosion and Sediment Control Measures	3
TOTAL		**88 Working Days**

8.0 REFERENCES

New Jersey State Soil Conservation Committee, 1999. "Standards for Soil Erosion and Sediment Control in New Jersey."

APPENDIX A

FIGURES

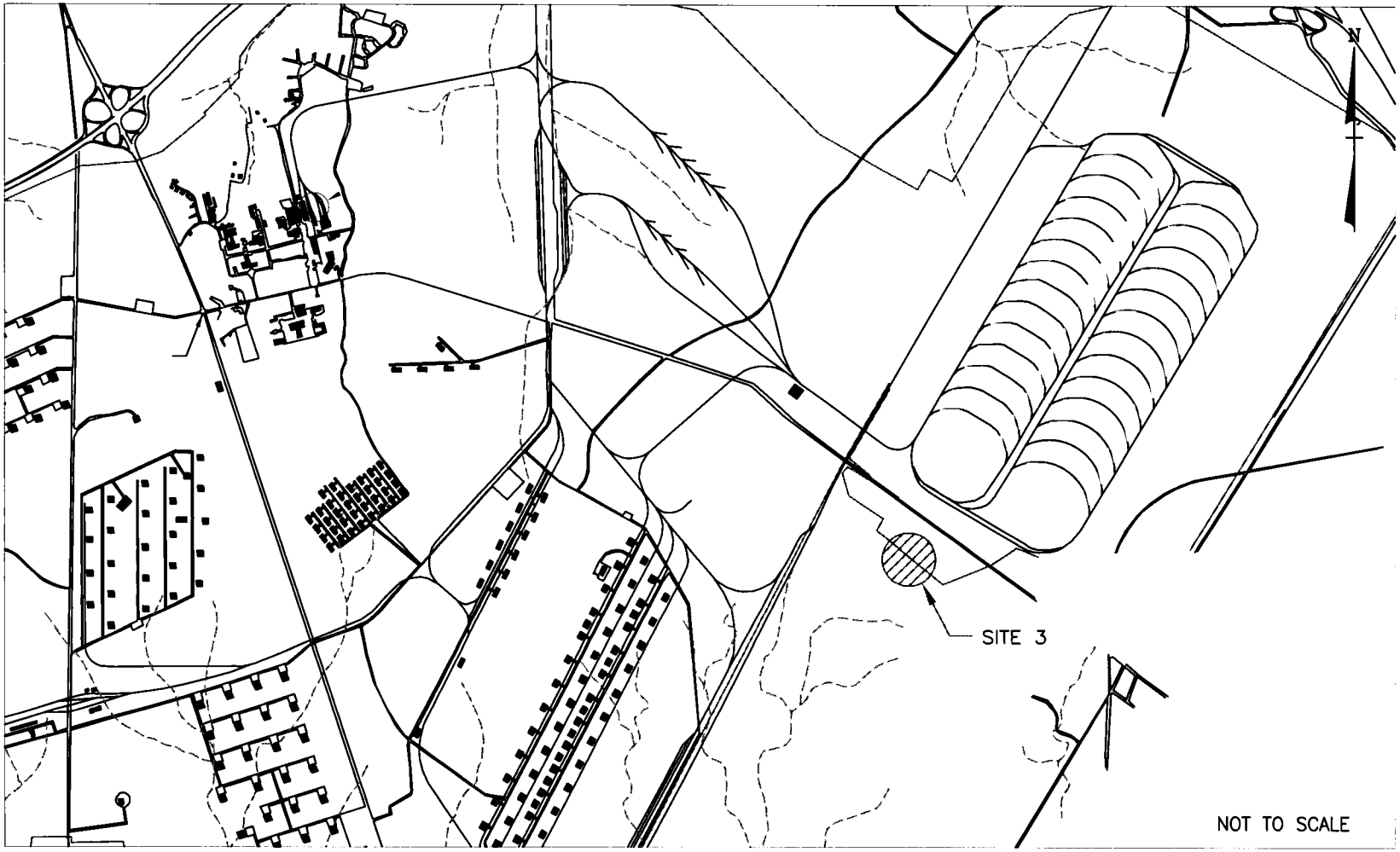


NOT TO SCALE

SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3

FIGURE 1
SITE LOCATION MAP
NAVAL WEAPONS STATION EARLE

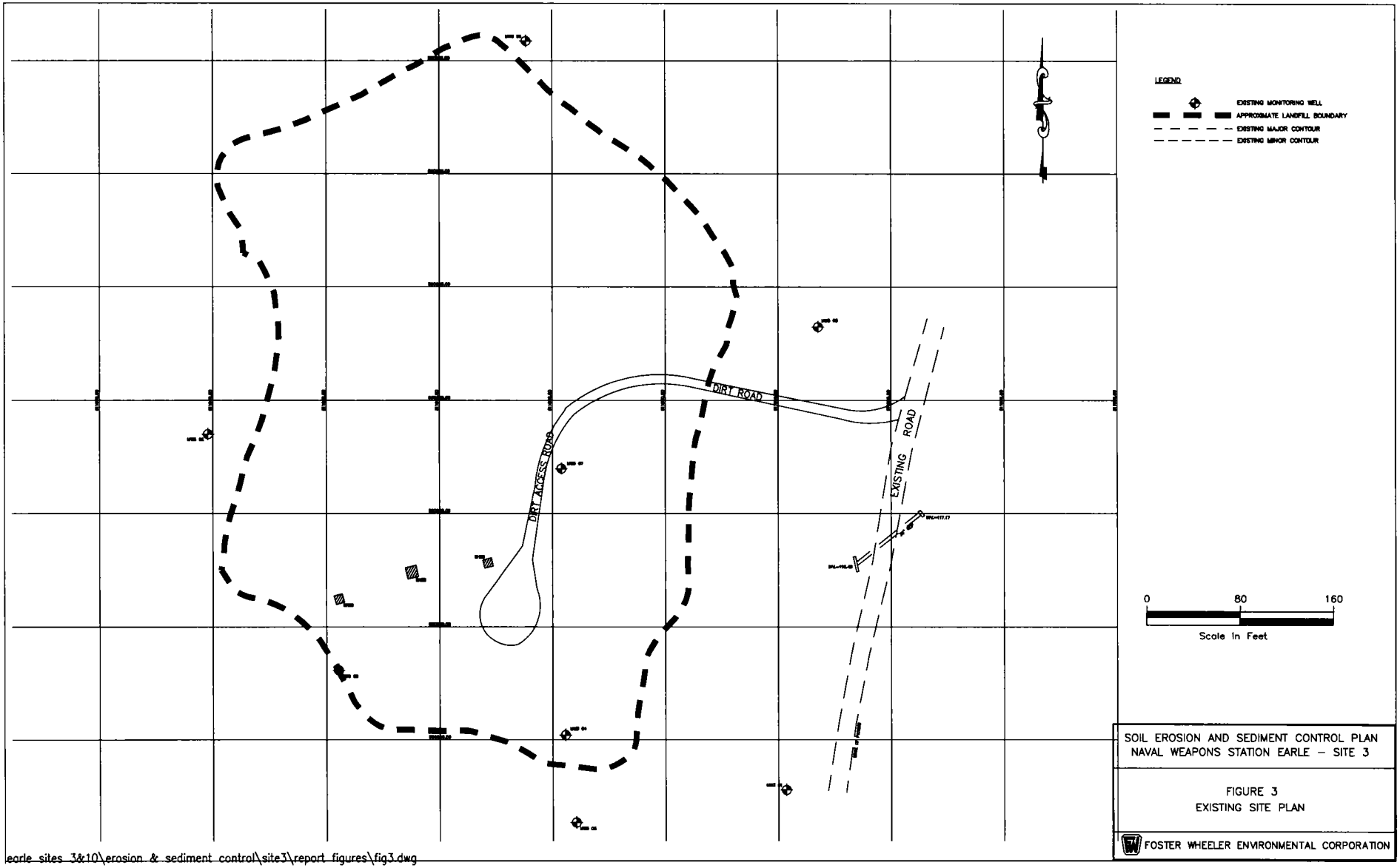
FOSTER WHEELER ENVIRONMENTAL CORPORATION



SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3

FIGURE 2
SITE LOCATION MAP – SITE 3

FOSTER WHEELER ENVIRONMENTAL CORPORATION



SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3

FIGURE 3
EXISTING SITE PLAN

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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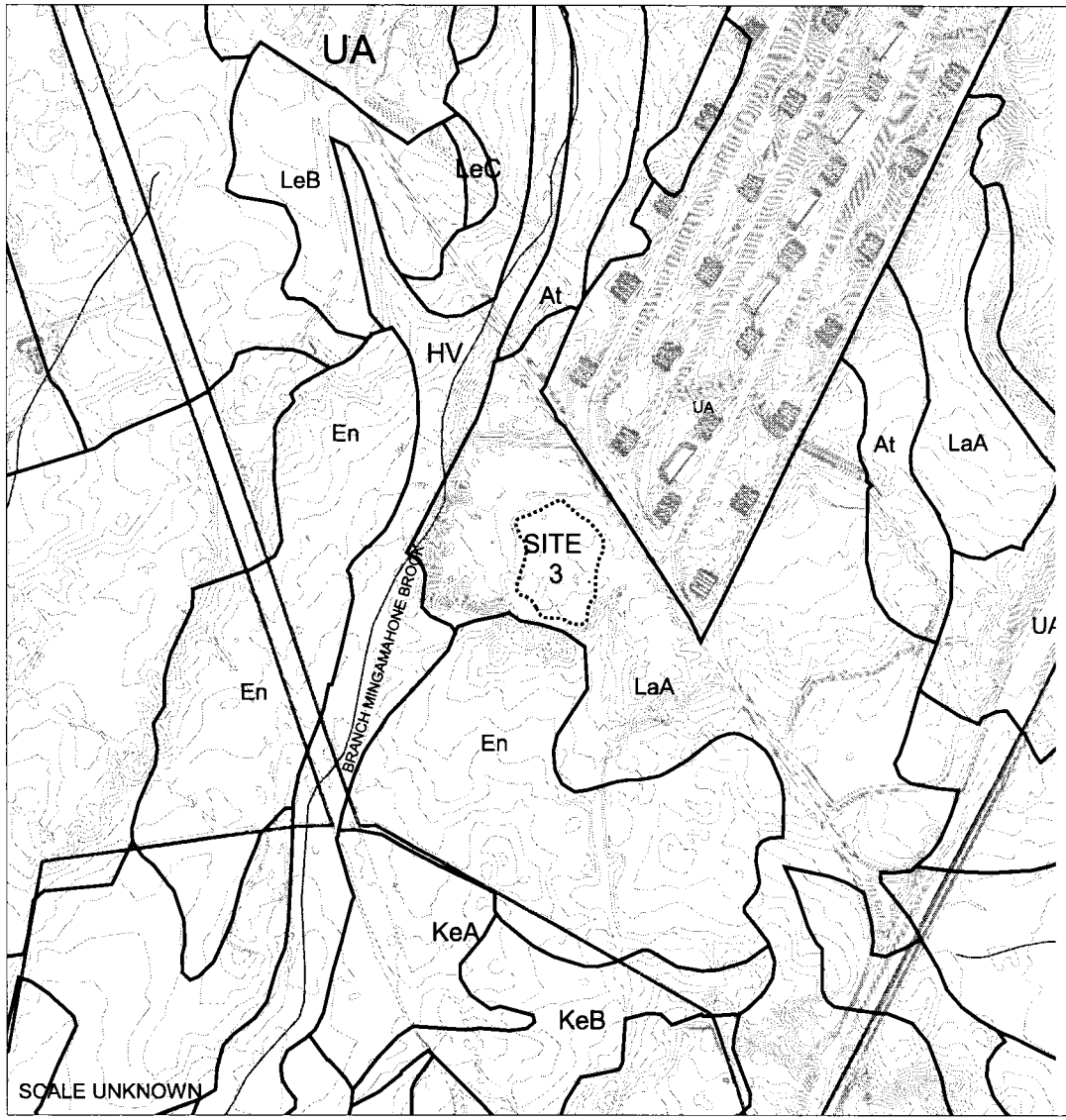


Legend

At - Atsion sand. Nearly level, poorly drained soil in depressional areas and on broad flats. Permeability of the Atsion soil is moderately rapid or rapid in the subsoil and rapid in the substratum.

En - Elkton loam. Nearly level, poorly drained soil in depression areas and broad flats. Permeability of this Elkton soil is slow in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. Runoff is slow. Erosion is a slight hazard.

HV - Humaquepts, frequently flooded.
Nearly level, somewhat poorly drained to very poorly drained soils.
They are on flood plains along perennial and intermittent streams.
These soils differ greatly from place to place. Permeability of Humaquepts, frequently flooded, is moderate or moderately rapid in the subsoil and the substratum.

LaA- Lakehurst sand, 0 to 2 percent slopes.
This is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides.
Permeability of this Lakehurst soil is rapid in the subsoil and the substratum.

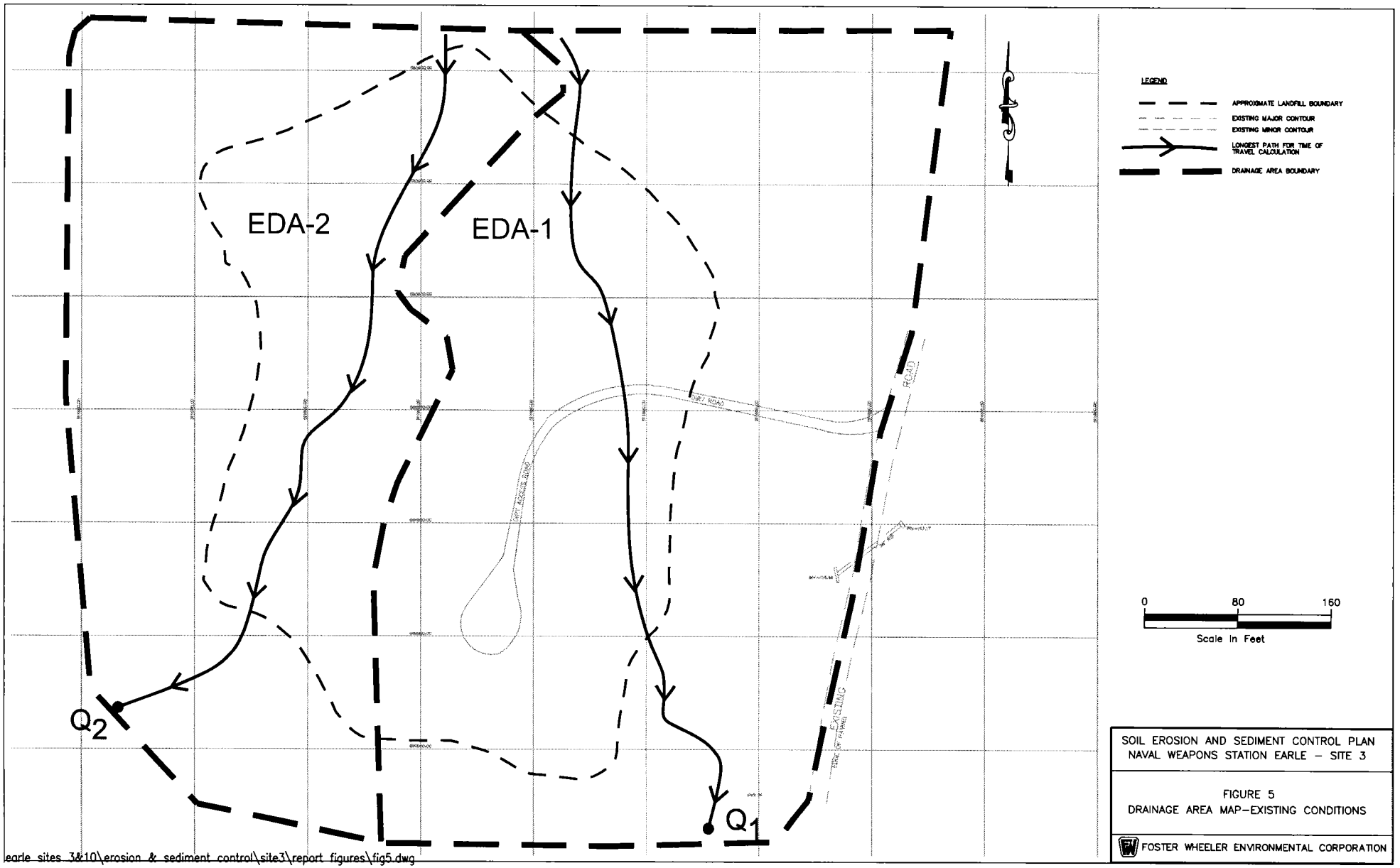
UA - Udorthents, smooth.
This soil unit consists of areas of soil that have been altered by excavating or filling. The properties of this soil difffer from place to place. Onsite investigation and evaluation are needed for most uses.

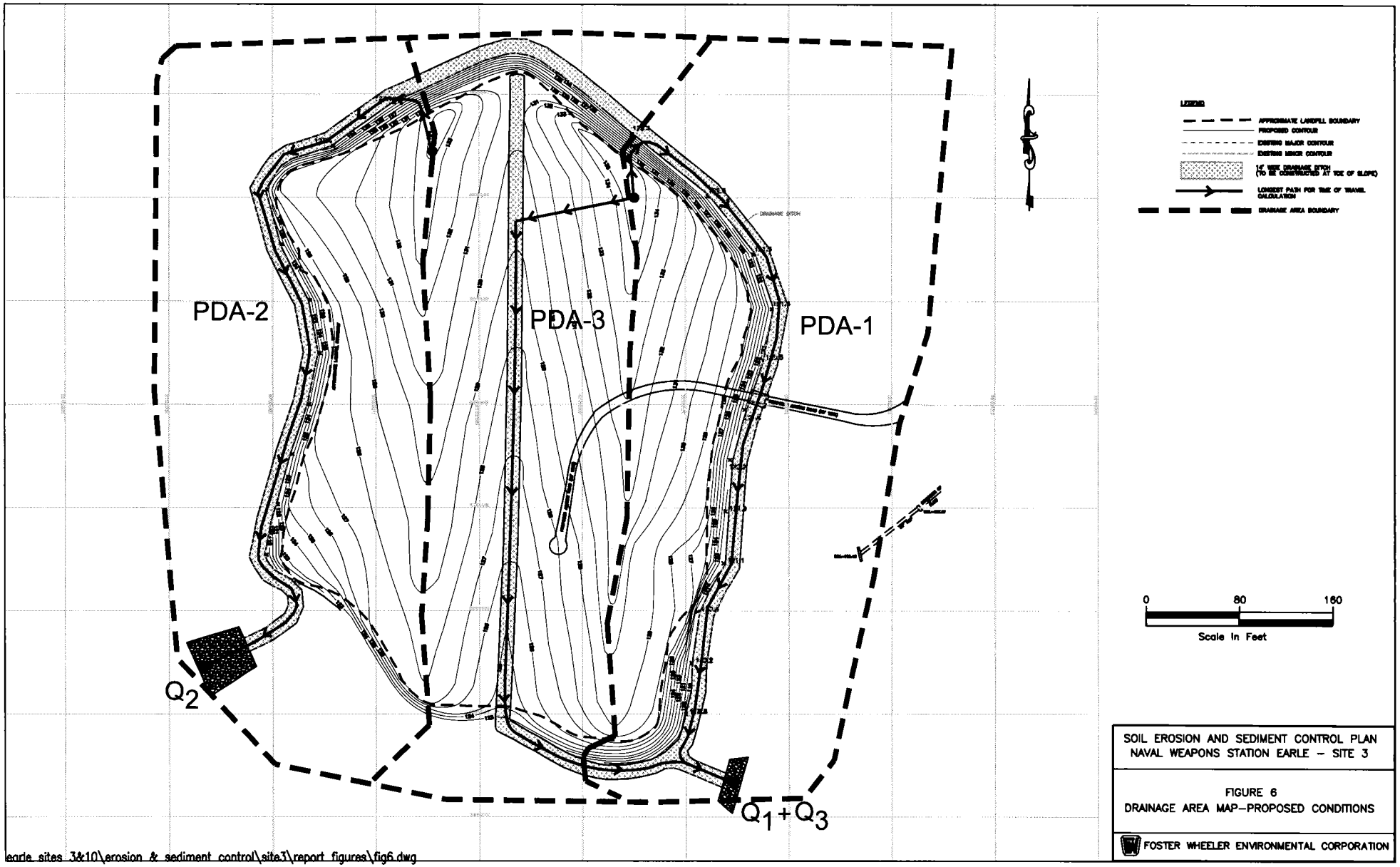
Source: USDA, Soil Conservation Service,
"Soil Survey of Monmouth County, New Jersey".

SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 3

FIGURE 4
SOILS MAP

FOSTER WHEELER ENVIRONMENTAL CORPORATION


EDA-2
EDA-1
Q_2
Q_1
LEGEND
APPROXIMATE LANDFILL BOUNDARY
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
LONGEST PATH FOR TIME OF TRAVEL CALCULATION
DRAINAGE AREA BOUNDARY
0
80
160
Scale In Feet
SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3
FIGURE 5
DRAINAGE AREA MAP–EXISTING CONDITIONS
FOSTER WHEELER ENVIRONMENTAL CORPORATION
earle_sites_3&10\erosion_&_sediment_control\site3\report_figures\fig5.dwg



SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3

FIGURE 6
DRAINAGE AREA MAP–PROPOSED CONDITIONS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

earle_sites_3&10\erosion_&_sediment_control\site3\report_figures\fig6.dwg

APPENDIX B

STORMWATER CALCULATIONS

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DMM	8/3/01
Location	**Checked**	**Date**
Site 3 - Q1 (area EDA1)	KJB	8/13/01

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Lakehurst Sand (B)	Woods - Grass Combination (Area = 290,319 ft²)	65			6.66	432.9
					Totals ➡	6.66 / 432.9

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{432.9}{6.66} = 65$; Use CN ➡ **65**

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.75	1.82	2.35

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{65} - 10 = 5.38$$

2 yr storm

$$Q = \frac{(P-0.2S)^2}{P+0.8S} = \frac{[3.5 - (0.2)(5.38)]^2}{3.5 + 0.8(5.38)} = \frac{5.88}{7.80} = 0.75$$

10 yr storm

$$Q = \frac{[5.25 - (0.2)(5.38)]^2}{5.25 + 0.8(5.38)} = \frac{17.42}{9.55} = 1.82$$

25 yr storm

$$Q = \frac{[6.0 - (0.2)(5.38)]^2}{6.0 + 0.8(5.38)} = \frac{24.25}{10.30} = 2.35$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Navy – Earle	DMM	8/3/01
Location	**Checked**	**Date**
Site 3 – Q1 (area EDA1)	KJB	8/13/01

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID	AB		
1. Surface description (table 3-1)	Dense Grass		
2. Manning's roughness coefficient, n (table 3-1)	0.25		
3. Flow length, L (total L † 300 ft) ft	299		
4. Two-year 24-hour rainfall, P_2 in	3.5		
5 Land slope, s ft/ft	0.017		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t hr	0.60	+	= 0.60

Segment ID	BC		
7. Surface description (paved or unpaved)	Unpaved		
8. Flow length, L ft	446		
9. Watercourse slope, s ft/ft	0.020		
10. Average velocity, V (figure 3-1) ft/s	2.1		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.059	+	= 0.059

Channel flow

Segment ID			
12. Cross sectional flow area, a ft^2			
13. Wetted perimeter, p_w ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft			
15 Channel slope, s ft/ft			
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V ft/s			
18. Flow length, L ft			
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 0.66

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
Navy - Earle	DMM	8/3/01
Location	**Checked**	**Date**
Site 3 - Q1 (Area EDA 1)	KJB	8/13/01

Check one: [X] Present [ ] Developed

1. Data

Drainage area ..... A_m = 0.010 mi^2 (acres/640)

Runoff curve number ..... CN = 65 (From worksheet 2)

Time of concentration ..... T_c = 0.66 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = _____ percent of A_m (_____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.077	1.077	1.077
5. Compute I_a/P		0.308	0.205	0.180
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4– III)	csm/in	305	340	350
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.75	1.82	2.35
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	2.29	6.19	8.23
(Where $q_p = q_u A_m Q F_p$)				
36" RCP Q =		63.46	63.46	63.46
Total Q =		65.75	69.65	71.69

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DMM	7/24/01
Location	**Checked**	**Date**
Site 3 - Q_2 (area EDA 2)	KSB	8/13/01

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Lakehurst Sand (B)	Woods - Grass Combination (Area = 211,986 ft²)	65			4.87	316.6
[1] Use only one CN source per line				Totals ➡	4.87	316.6

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{316.6}{4.87} = 65$; **Use CN ➡** 65

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.75	1.82	2.35

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Navy - Earle	DMM	8/3/01
Location	**Checked**	**Date**
Site 3 - Q_2 (area EDA2)	KJB	8/13/01

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

	Segment ID	AB		
1.	Surface description (table 3-1)	Dense Grass		
2.	Manning's roughness coefficient, n (table 3-1)	0.25		
3.	Flow length, L (total L † 300 ft) ft	299		
4.	Two-year 24-hour rainfall, P_2 in	3.5		
5.	Land slope, s ft/ft	0.010		
6.	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.74	+	= 0.74

Shallow concentrated flow

	Segment ID	BC		
7.	Surface description (paved or unpaved)	Unpaved		
8.	Flow length, L ft	431		
9.	Watercourse slope, s ft/ft	0.014		
10.	Average velocity, V (figure 3-1) ft/s	1.9		
11.	$T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.063	+	= 0.063

Channel flow

	Segment ID			
12.	Cross sectional flow area, a ft^2			
13.	Wetted perimeter, p_w ft			
14.	Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft			
15	Channel slope, s ft/ft			
16.	Manning's roughness coefficient, n			
17.	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s			
18.	Flow length, L ft			
19.	$T_t = \frac{L}{3600\ V}$ Compute T_t hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 0.803

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
Navy - Earle	DMM	8/3/01
Location	**Checked**	**Date**
Site 3 - Q_2 (area EDA2)	KJB	8/8/01

Check one: ☒ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.008 mi^2 (acres/640)

Runoff curve number ..... CN = 65 (From worksheet 2)

Time of concentration ..... T_c = 0.803 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = _____ percent of A_m (_____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.077	1.077	1.077
5. Compute I_a/P		0.308	0.205	0.180
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4– III)	csm/in	280	320	325
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.75	1.82	2.35
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	1.68	4.66	6.11

(Where $q_p = q_u A_m Q F_p$)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy – Earle	DMM	8/9/01
Location	**Checked**	**Date**
Site 3 – Q1 (PDA1)	KJB	8/13/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Top Soil (B)	Top of Landfill, Grass (Area = 45,086 ft²)	61			1.04	63.44
Lakehurst Sand (B)	Cleared + Grubbed, Re-Vegetated (Area = 24,546 ft²)	61			0.56	34.16
Lakehurst Sand (B)	Woods – Grass Combination (Area = 129,022 ft²)	65			2.96	192.4
[1] Use only one CN source per line				Totals ➡	4.56	290.0

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{290}{4.56} = 63.6$; **Use CN ➡** 64

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.71	1.74	2.26

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{64} - 10 = 5.63$$

2 yr storm

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{[3.5 - 0.2(5.63)]^2}{3.5 + (0.8)(5.63)} = \frac{5.64}{8.0} = 0.71$$

10 yr storm

$$Q = \frac{[5.25 - 0.2(5.63)]^2}{5.25 + (0.8)(5.63)} = \frac{17.01}{9.75} = 1.74$$

25 yr storm

$$Q = \frac{[6.0 - 0.2(5.63)]^2}{6.0 + 0.8(5.63)} = \frac{23.76}{10.50} = 2.26$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - ERIE	KJB	8/14/01
Location	**Checked**	**Date**
SUB 3 - Q. (PDA 1)	DMM	8/14/01

Check one: ☐ Present ☒ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB	BC	
1. Surface description (table 3-1)	DENSE GRASS		RIP RAP (3"-6")
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.25	.032
3. Flow length, L (total L ≤ 300 ft) ft	140	20	20
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	3.5
5. Land slope, s ft/ft	0.05	0.33	0.083
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.21	+ 0.02	= 0.24 0.06

Segment ID			
7. Surface description (paved or unpaved)			
8. Flow length, L ft			
9. Watercourse slope, s ft/ft			
10. Average velocity, V (figure 3-1) ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+	=

Channel flow

Segment ID	CD		
12. Cross sectional flow area, a ft^2	16.00		
13. Wetted perimeter, p_w ft	14.64		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	1.09		
15 Channel slope, s ft/ft	0.01		
16. Manning's roughness coefficient, n	0.25		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	0.63		
18. Flow length, L ft	815		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.36	+	= 0.36

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 0.60

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAVY - EARLE	KJB	8/14/01
Location	**Checked**	**Date**
SITE 3 - Q, (PDA 2)	DMM	8/14/01

Check one: ☐ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.007 mi^2 (acres/640)

Runoff curve number ..... CN = 64 (From worksheet 2)

Time of concentration ..... T_c = 0.60 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.125	1.125	1.125
5. Compute I_a/P		0.321	0.214	0.188
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4-III)	csm/in	310	350	370
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.71	1.74	2.26
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p (Where $q_p = q_u A_m Q F_p$)	ft^3/s	1.54	4.26	5.85
+ Q_{FULL} 36" RCP		63.46	63.46	63.46
+ Q_3 (PDA 3)		0.84	2.89	3.95
TOTAL		65.84	70.61	73.26

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DHM	8/9/01
Location	**Checked**	**Date**
Site 3 - Q_2 (PDA 2)	KJB	8/13/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Top Soil (B)	Top of Landfill, Grass (Area = 56,506 ft²)	61			1.30	79.3
Lakehurst Sand (B)	Cleared + Grubbed, Re-Vegetated (Area = 23,992 ft²)	61			0.55	33.55
Lakehurst Sand (B)	Woods - Grass Combination (Area = 99,991 ft²)	65			2.30	149.5
[1] Use only one CN source per line				Totals ➡	4.15	262.35

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{262.35}{4.15} = 63.2$; **Use CN ➡** 63

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.66	1.67	2.18

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - EBRIC	KJB	8/14/01
Location	**Checked**	**Date**
SUB 3 - O2 (PDA 2)	DMM	8/14/01

Check one: ☐ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB	BC	DE
1. Surface description (table 3-1)	DENSE	GRASS	3" RIP RAP
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.25	0.032
3. Flow length, L (total L † 300 ft) ft	25	20	55
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	3.5
5. Land slope, s ft/ft	0.05	0.33	0.20
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.054	+ 0.021	= 0.09 0.011

Segment ID			
7. Surface description (paved or unpaved)			
8. Flow length, L ft			
9. Watercourse slope, s ft/ft			
10. Average velocity, V (figure 3-1) ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+	=

Channel flow

Segment ID	CD	
12. Cross sectional flow area, a ft^2	16.00	
13. Wetted perimeter, p_w ft	14.64	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	1.09	
15 Channel slope, s ft/ft	0.01	
16. Manning's roughness coefficient, n	0.25	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	0.63	
18. Flow length, L ft	743	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.33 +	= 0.33

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 0.4

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAVY - EARLE	KJB	8/14/01
Location	**Checked**	**Date**
Stn 3 - Q_2 (PDA 2)	DMM	8/14/01

Check one: ☐ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.006 mi^2 (acres/640)

Runoff curve number ..... CN = 63 (From worksheet 2)

Time of concentration ..... T_c = 0.42 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.175	1.175	1.175
5. Compute I_a / P		0.34	0.22	0.20
6. Unit peak discharge, q_u (Use T_c and I_a / P with exhibit 4–III)	csm/in	350	400	415
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.66	1.67	2.15
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	1.39	4.01	5.43

(Where $q_p = q_u A_m Q F_p$)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DMM	8/9/01
Location	**Checked**	**Date**
Site 3 - Q_3 (PDA3)	KJB	8/13/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Top Soil (B)	Top of Landfill, Grass (Area = 111,255 ft²)	61			2.55	155.55
Lakehurst Sand (B)	Cleared + Grubbed, Re-Vegetated (Area = 9,725 ft²)	61			0.22	13.42
Lakehurst Sand (B)	Woods - Grass Combination (Area = 12,202 ft²)	65			0.28	18.2
[1] Use only one CN source per line				Totals ➡	3.05	187.17

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{187.17}{3.05} = 61.4$; Use CN ➡ **61**

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.57	1.52	2.0

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{61} - 10 = 6.39$$

2 yr storm

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{[3.5 - 0.2(6.39)]^2}{3.5 + 0.8(6.39)} = \frac{4.94}{8.61} = 0.57$$

10 yr storm

$$Q = \frac{[5.25 - 0.2(6.39)]^2}{5.25 + 0.8(6.39)} = \frac{15.78}{10.36} = 1.52$$

25 yr storm

$$Q = \frac{[6.0 - 0.2(6.39)]^2}{6.0 + 0.8(6.39)} = \frac{22.30}{11.11} = 2.0$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - EAGLE	KJR	8/14/01
Location	**Checked**	**Date**
SITE 3 - O_2 (PDP3)	DMM	8/15/01

Check one: ☐ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (applicable to T_c only)

Segment ID	AB	CD
1. Surface description (table 3-1)	DENSE GRASS	3" RIPRAP
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.032
3. Flow length, L (total L ≤ 300 ft) ft	112	20
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5
5. Land slope, s ft/ft	0.05	0.20
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t hr	0.18 +	0.011 = 0.19

Segment ID		
7. Surface description (paved or unpaved)		
8. Flow length, L ft		
9 Watercourse slope, s ft/ft		
10. Average velocity, V (figure 3-1) ft/s		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+	=

Channel flow

Segment ID	BC	
12. Cross sectional flow area, a ft^2	15.00	
13. Wetted perimeter, p_w ft	14.64	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	1.09	
15 Channel slope, s ft/ft	0.01	
16. Manning's roughness coefficient, n	0.25	
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V ft/s	0.63	
18. Flow length, L ft	749	
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.33 +	= 0.33
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		0.52

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAM-EARLE	KJB	8/14/01
Location	**Checked**	**Date**
SUB 3 - Q_2 (PDA 3)	DMM	8/15/01

Check one: ☐ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.005 mi^2 (acres/640)

Runoff curve number ..... CN = 61 (From worksheet 2)

Time of concentration ..... T_c = 0.52 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (_____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	1.279	1.279	1.279
5. Compute I_a / P		0.37	0.24	0.21
6. Unit peak discharge, q_u (Use T_c and I_a / P with exhibit 4- III)	csm/in	295	380	395
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.57	1.52	2.0
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	0.84	2.89	3.95

(Where $q_p = q_u A_m Q F_p$)

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/13/01 SHEET 1 OF 7

CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

CLIENT NAVY - EFDLC

PROJECT SITE 3 -

SUBJECT FLOW FROM 36" Φ RCP (FULL)

FIND FULL FLOW

$d = 36" = 3'$

FIND AREA (A) $= \pi d^2/4 = \pi(3^2)/4 = 7.07\ FT^2$

FIND WETTED PERIMETER (WP) $= 2\pi r$ (FULL FLOW)
$= 2\pi(1.5) = 9.42\ FT$

FIND HYDRAULIC RADIUS (R) $= A/WP = 7.07/9.42 = 0.75\ FT$

FIND FULL FLOW (Q)

$Q = 1.49/n\ AR^{2/3} S^{1/2}$

$n = 0.013$ FOR CONCRETE PIPE

S = SLOPE $= \frac{RISE}{RUN} = \frac{117.17 - 116.49}{72} = 0.009\ FT/FT$

↳ FROM SITE PLAN INVERTS

$\therefore Q = 1.49/0.013\ (7.07)(0.75^{2/3})(0.009^{1/2})$

$= 63.46\ CFS$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/13/01 SHEET 2 OF 7

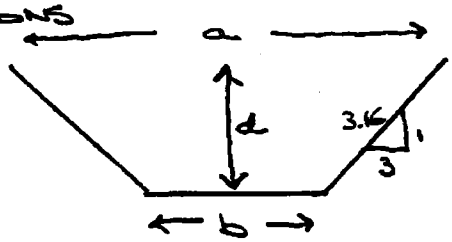
CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

CLIENT NAVY

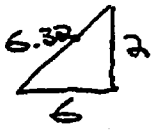
PROJECT FORBES

SUBJECT SITE 3 - PROPOSED SWALE CALCULATIONS

ASSUMED DIMENSIONS



b = 2'
d = 2'



FIND AREA (A)

$= \frac{1}{2}(d)(a+b)$

$= \frac{1}{2}(2)(2(3)(2)+2+2)$

$= 16\ FT^2$

FIND WETTED PERIMETER (WP)

$WP = 2(6.32)+2$

$WP = 14.64\ FT$

FIND HYDRAULIC RADIUS (R)

$R = A/WP = 16/14.64 = 1.09$

FIND Q FOR SWALE

- SLOPE = 1% = 0.01 (DESIGN)
- n = 0.25 (GRASS LINED SWALE) - USDA TR-55 MANUAL

$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$= \frac{1.49}{0.25}(16)(1.09)^{2/3}(0.01^{1/2})$

$Q = 10.11\ CFS$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 8/8/01 SHEET 3 OF 7

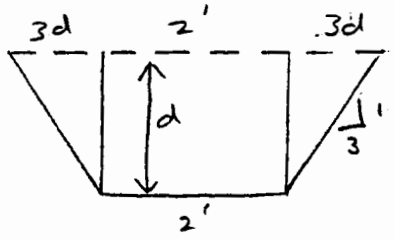
CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

CLIENT Navy

PROJECT Earle

SUBJECT Site 3 – Proposed Swale Calculations

Find water depth (d) for Q_{25}



Use Manning's Eq.

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

$$A = \frac{1}{2} d (a + b)$$
$$= \frac{1}{2} d [2 + (3d + 3d + 2)]$$
$$= \frac{1}{2} d (6d + 4)$$
$$= 3d^2 + 2d$$

$$WP = 3.16d + 2 + 3.16d = 6.32d + 2$$

$$R = \frac{A}{WP} = \frac{3d^2 + 2d}{6.32d + 2} \qquad S = 0.01 \text{ (design)}$$

Max $Q_{25} = 9.80$ ft^3/s (on eastern side of landfill)

$$9.80 = \frac{1.49}{0.25} (3d^2 + 2d) \left[\frac{3d^2 + 2d}{6.32d + 2} \right]^{2/3} (0.01)^{1/2}$$

$d = 1.9'$

Design $d = 2.0'$

$1.9' < 2.0'$

Design is adequate

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 8/10/01 SHEET 4 OF 7

CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

CLIENT Navy

PROJECT Earle

SUBJECT Site 3 – Proposed Swale Calculations

Swale Stability

Based on the Rational Method Calculations, the maximum Q that will enter the proposed swale = 9.80 ft^3/s (Q_1+Q_2)

Stability checks are not required if the actual velocity is 1.8 ft/s or less → Standards for Soil Erosion + Sediment Control (NJ) July '99

$Q = UA$

U = velocity (ft/s)
A = area of swale (ft^2)
Q = maximum flow (ft^3/s)

$$U = \frac{Q}{A} = \frac{9.80\ ft^3/s}{16\ ft^2} = 0.62\ ft/s$$

0.62 ft/s << 1.8 ft/s

Therefore, no stabilization is required. Proposed swales shall be lined with vegetative lining.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

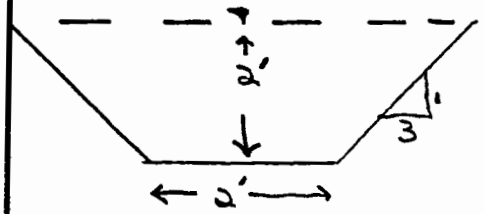
BY KJB DATE 8/14/01 SHEET 5 OF 7

CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

CLIENT NAVY EFA

PROJECT SITE 3

SUBJECT CONDUIT OUTLET PROTECTION - PDA 1 (Q_1)



- USING STANDARD 12-1. OF THE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL

FIND LENGTH OF APRON (L_a) REQUIRED

$L_a = (1.8\, q/D_o^{1/2}) + 7D_o$

$D_o = 2'$

$W_o = 14$

$q = \frac{Q_{25}}{W_o} = \frac{9.80}{14} = 0.7$

- FOR Q_1
- TOTAL Q EQUALS SUM OF 25 YR Q FROM AREAS PDA-1 AND PDA-3
∴ FROM TR-55 CALCS $Q_{25\,TOT} = Q_{125} + Q_{325} = 5.85 + 3.95 = 9.80$ CFS

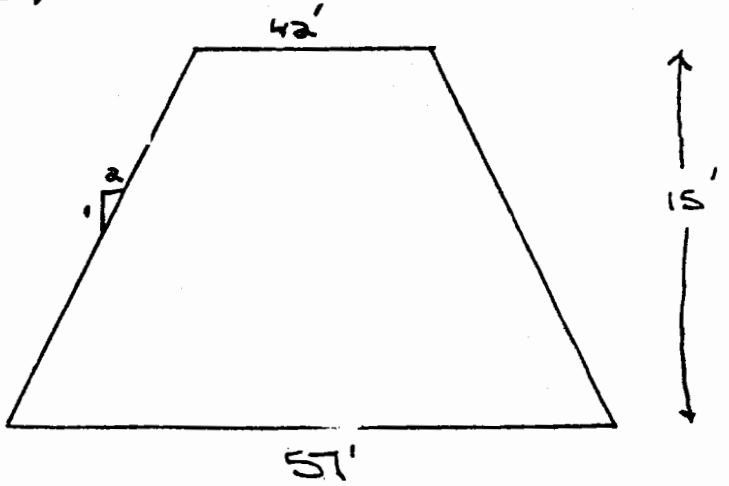
$L_a = 1.8\left(\frac{0.72}{2^{1/2}}\right) + 7(2)$

$L_a = 14.89$ FT ≈ FT

$1 \leftarrow 3W_o \rightarrow 1$

FIND WIDTH OF APRON (W)

$W = 3W_o + L_a$
$= 3(14) + 15$
$= 57$ FT



FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/14/01 SHEET 6 OF 7

CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

CLIENT Navy - ESBVC

PROJECT Site 3

SUBJECT Concrete Outlet Protection - Pond 2 (Q1)

FIND MEDIAN STONE DIAMETER - D_{50}

$$D_{50} = \frac{0.06}{0.2 D_{50}} q^{1.33} = \frac{0.06}{0.2(2)} (0.72)^{1.33} = 0.25'$$

$$= 3'' \phi$$

$\therefore D_{50} = 3''$

FIND THICKNESS OF RIP-RAP

- THICKNESS = $2 D_{50}$ DUE TO THE USAGE OF FILTER FABRIC

$\therefore$ THICKNESS = $2(3) = 6''$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/14/01 SHEET 7 OF 7

CHKD. BY FMP DATE 8/15/01 OFS NO. DEPT. NO.

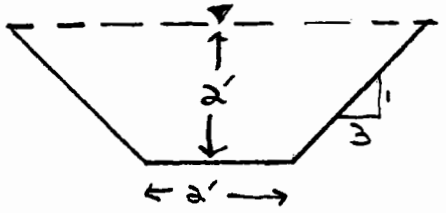
CLIENT NAVY - EARLE

PROJECT SITE 3

SUBJECT CHANNEL OUTLET PROTECTION - PDA 2 (Q_2)

- FROM TR-55 CALCULATION FOR AREA PDA2 (Q_2), FLOW (Q_{25}) FOR 25 YR STORM:

$Q_{25} = 5.43$ cfs



- USING STANDARD 12-1 (CHANNEL OUTLET PROTECTION)

L_a = LENGTH OF APRON

$= 1.8\left(\frac{q}{D_o^{1/2}}\right) + 7D_o$

$D_o = 2'$

$W_o = 14'$

$q = \frac{Q_{25}}{W_o} = \frac{5.43}{14} = 0.40$

$\therefore 1.8\left(\frac{0.40}{2^{1/2}}\right) + 7(2)$

$= 14.51' \approx 15' = L_a$

WIDTH OF APRON (W) $= 3W_o + L_a$

$= 3(14) + 15$

$= 57'$

MEDIAN STONE DIAMETER (D_{50}) $= \frac{0.06}{0.2D_o} q^{1.33} = \frac{0.06}{0.2(2)}(0.40)^{1.33}$

$D_{50} = 0.12' = 1.5''$ $\therefore$ USE 3"ϕ

THICKNESS OF RIP RAP APRON

- WITH USE OF FILTER FABRIC → THICKNESS $= 2D_{50}$

$= 2(1.5)$

$= 3''$

- HOLLISTER, STANDARD CALLS FOR MIN. 6" $\therefore$ THICKNESS = 6"

ATTACHMENT #2

Soil Erosion and Sediment Control Plan – Site 10

New Jersey Natural Resources Conservation Program

FREEHOLD SOIL CONSERVATION DISTRICT
(Serving Middlesex and Monmouth Counties)

211 FREEHOLD ROAD
MANALAPAN, NEW JERSEY 07726
Tel: (732) 446-2300
Fax: (732) 446-9140

12/27/01

US NAVAL WEAPONS STATION EARLE
201 HIGHWAY 34 SOUTH
COLTS NECK NJ 07722

Ref.#: 2001-0535
Proj.: US NAVAL WEAPONS STATION - SITE 10
Twp. : COLTS NECK
Block: N/A
Lots : N/A

*** CERTIFICATION LETTER ***

Pursuant to N.J.S.A. 4:24-39 et seq., the N.J. Soil Erosion and Sediment Control Act, the Freehold Soil Conservation District hereby grants certification of the soil erosion and sediment control plan for the above referenced project, subject to the following:

1. That the applicant carries out all land disturbance activities in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, promulgated by the State Soil Conservation Committee.

2. The owner/applicant must obtain a District issued Report of Compliance prior to the issuance of any Certificates of Occupancy by the municipality.

3. Changes in the certified plan relating to, or that will affect land disturbance on the site, must be submitted to the District office for certification.

A copy of the certified plan must be kept on the job site at all times.

This certification is valid for 3 ½ years, or for 2 years in the event the project is for mining, landfill, or storage and is limited to the controls specified in this plan. It is not authorization to engage in proposed land use unless the municipality or other controlling agency has previously approved such use. Failure to comply with the above conditions may result in the issuance of a **STOP CONSTRUCTION ORDER.**

Sincerely,

Ines M. Grimm
District Manager

DISTRIBUTION: **WHITE** - Applicant **CANARY** - District **WHITE** - Appl. Eng.
CANARY - Municipal Eng. **PINK** - Construction Official
GOLD - Plan. Board

Prepare in quintuplicate (original and 4 copies)

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
EFANENAVFACENGCOM 4335/3 (Rev. 6/80)

CONTROL NO. 03C

CONTRACT NO.	CONTRACT TASK ORDER NO.	ACTIVITY LOCATION
N62472-99-D-0032	**0040**	**NWS Earle – Colts Neck, NJ**

PROJECT TITLE:
Landfill Capping OU-6, Sites 3 and 10

FROM:	DATE
Foster Wheeler Environmental Corp.: Program QC Manager Thomas Kelly	December 20, 2001
TO:	DATE
C. Davis (E-Copy and CD)	December 20, 2001

1. THE CONTRACTOR SUBMITTALS LISTED BELOW ARE FORWARDED FOR YOUR REVIEW AND RECOMMENDATIONS.
(a) APPLY APPROPRIATE STAMP IMPRINT TO EACH SUBMITTAL AND INDICATE REVIEW COMMENTS, AS REQUIRED.
(b) RETAIN ONE (1) COPY OF THIS TRANSMITTAL FORM AND RETURN REMAINING COPIES WITH REVIEWED SUBMITTALS TO ROICC.

2. THESE SUBMITTALS SHOULD BE RETURNED TO THIS OFFICE BY _____

3. _____

E-COPY TO:

HARD COPY TO: **EFANE:** S. Beebe, J. Kolicius, D. Zari
NWSEARLE: L. Burg
FSCD: B. Shotland (3 Copies)

☐ ROICC ☐ RPM ☐ CSO

Thomas Joseph Kelly DECEMBER 20, 2001
SIGNATURE AND DATE

FROM: DESIGNER	DATE
TO: ROICC	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE RETURNED, WITH ACTION TAKEN AS INDICATED.

2. _____

COPY TO:

☐ ROICC ☐ DESIGNER

SIGNATURE AND DATE

FROM: ROICC	DATE
TO: CONTRACTOR	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE APPROVED/DISAPPROVED AS SHOWN BELOW AND ON EACH STAMP IMPRINT.

COPY TO:
☐ ROICC ☐ OTHER

FOR COMMANDING OFFICER, ENGINEERING FIELD ACTIVITY NORTHEAST - NAVAL FACILITIES ENGINEERING COMMAND — DATE

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
1	SD-08, Statements; Revised Drawing C-5 – Site 10	Thomas Kelly			Submittal includes: Drawing C-5

FOSTER WHEELER ENVIRONMENTAL CORPORATION

December 20, 2001

Mr. Ben Shotland
Resource Conservationist II
Freehold Soil Conservation District
211 Freehold Road
Manalapan, New Jersey 07726

RE: Navy Weapons Station Earle – Site 10
Colts Neck, Monmouth County, New Jersey
FSCD Reference Number 2001-0535

Dear Mr. Shotland,

Enclosed, please find three (3) copies of the revised version (dated December 20, 2001) of Drawing C-5, Final Grading Plan, which supercedes the version of Drawing C-5 included in the Revised Soil Erosion and Sediment Control Plan submitted November 30, 2001. As we discussed during our recent telephone conversation, the Freehold Soil Conservation District (FSCD) has reviewed the November 30, 2001 Revised Soil Erosion and Sediment Control Plan and has requested that Drawing C-5 be modified to depict the limits of the proposed drainage swale located on the eastern side of the subject site. During this conversation, it was determined that the submission of a full set of plans was not necessary and the submittal of the revised Drawing C-5 would satisfy the requirements of the FSCD. Furthermore, as we discussed, the submittal of the revised Drawing C-5 will now allow the FSCD to certify the Soil Erosion and Sediment Control Plan for Site 10 of the Naval Weapons Station Earle.

Please review the enclosed documents and contact FWENC with any questions or comments. If you should have any questions, comments or require any additional information, please do not hesitate to contact me at (973) 630-8224. For you convenience, I can be reached via electronic mail at kbogatch@fwenc.com. FWENC's facsimile number is (973) 630-8474.

Very truly yours,
FOSTER WHEELER ENVIRONMENTAL CORPORATION

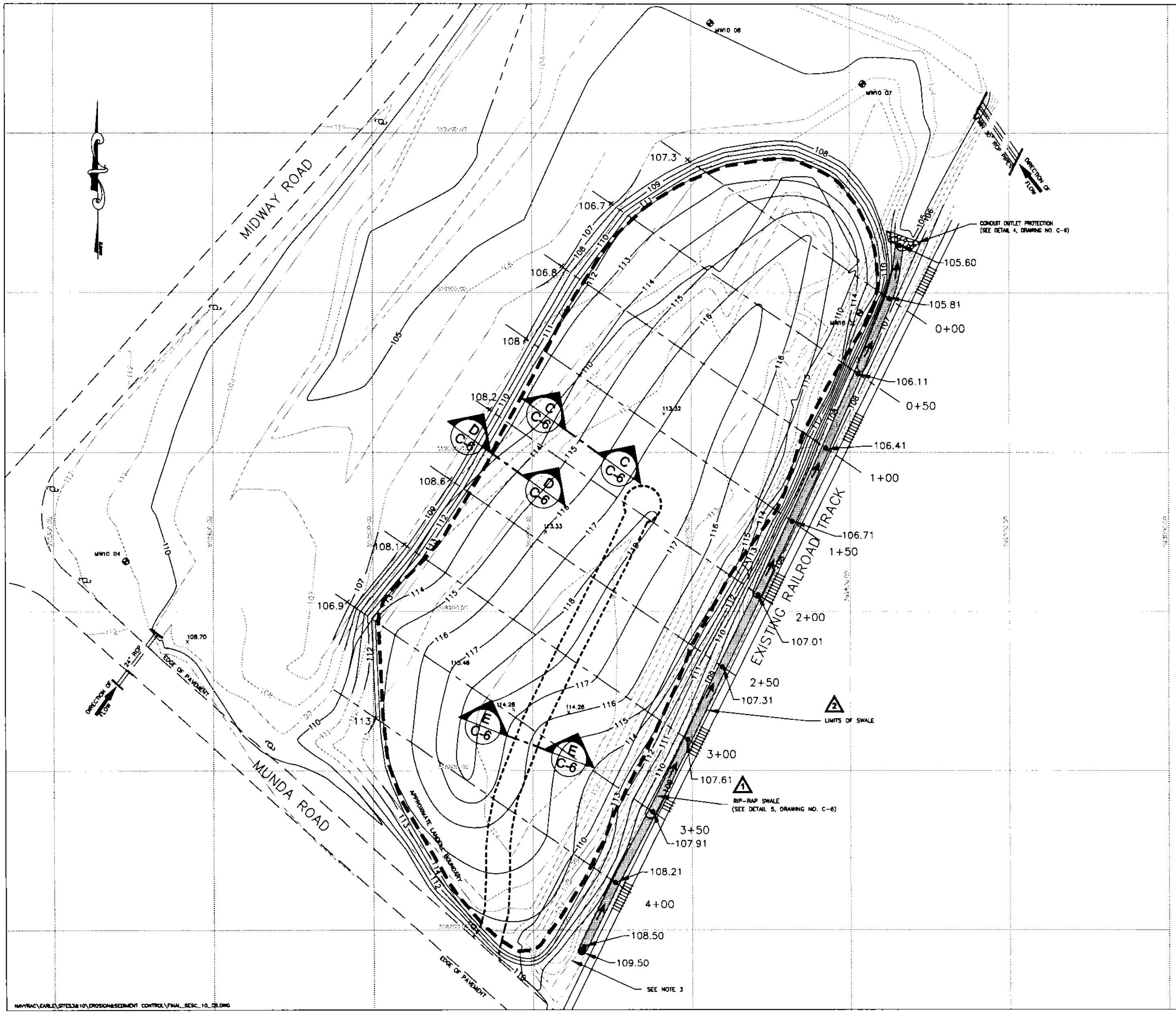
Keith J. Bogatch, P.E.
Senior Civil Engineer

w/enclosures

cc: R. Woodworth (FWENC)

\\S_langhorne\woodworthf$\RW\CTO 40\Freehold Resp Ltr Site 10 - Trans C-5.doc

2300 LINCOLN HIGHWAY EAST, ONE OXFORD VALLEY, SUITE 200, LANGHORNE, PA 19047-1829
PHONE (215) 702-4000 FAX (215) 702-4045



NOTES:

1. THE PROPOSED DRAINAGE SWALE SHALL HAVE A MINIMUM OF 0.6% SLOPE ALONG THE CENTERLINE.
2. THE CONTRACTOR SHALL MAINTAIN A MINIMUM DEPTH OF 1.0 FEET IN THE PROPOSED DRAINAGE SWALE.
3. THE CONTRACTOR SHALL USE COVER SOIL TO FILL THE TOPOGRAPHICALLY DEPRESSED AREA LOCATED IN THE SOUTHEASTERN CORNER OF THE LANDFILL.
4. THE PROPOSED RIP-RAP SWALE SHALL START AT PROPOSED SPOT ELEVATION 109.5 AND CONTINUE TO THE CONDUIT OUTLET PROTECTION.

LEGEND:

- EXISTING MONITORING WELL
- EXISTING UTILITY POLE
- × 113.33 SPOT ELEVATION
- SECTION LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FINAL CONTOUR
- APPROXIMATE LANDFILL BOUNDARY
- × 107.3 TOE OF SLOPE SPOT ELEVATION
- 109.50 PROPOSED SPOT ELEVATION
- 108.50 DRAINAGE SWALE INVERT ELEVATION
- FLOW DIRECTION
- EXISTING RAILROAD TRACKS
- EXISTING ROAD
- PROPOSED PERMANENT ACCESS ROAD
- RCP EXISTING REINFORCED CONCRETE PIPE
- 5' WIDE RIP-RAP LINED DRAINAGE SWALE (TO BE CONSTRUCTED AT TOE OF SLOPE)

0 30 60 90
SCALE: 1"=30'

SOURCE:

TOPOGRAPHIC PLAN – SITE NO. 10, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

FOSTER WHEELER ENVIRONMENTAL

REV.	DESCRIPTION	PREP BY	DATE	APPRVD
1	SWALE LINING CHANGED FROM GRASS TO RIP-RAP			
2	DEPICTION OF SWALE LIMITS			

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
LESTER PENNSYLVANIA
COLTS NECK NEW JERSEY

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10
FINAL GRADING PLAN

APPROVED | DATE | STATE FOR COMMANDER, NAVFAC

SEAL AREA

KEITH BODATCH, P.E.
NJPE NO. 40388

SAT TO | DATE 12/19/01
CODE I.D. NO.
SCALE: 1"=30'
SPEC. NO.
CONSTR. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET 6 OF 7
SIZE: D | DRAWING SH. NO. C-5

Prepare in quintuplicate (original and 4 copies)

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
NORTHNAVFACENGCOM 4335/3 (Rev. 6/80)

CONTROL NO. 003B

CONTRACT NO.	DELIVERY ORDER #	ACTIVITY LOCATION
N62472-99-D-0032	0040	NWS Earle, Colts Neck, New Jersey

PROJECT TITLE:
Landfill Capping OU-6, Sites 3 & 10

FROM:	DATE
Foster Wheeler Environmental Corp. – Program QCM: Tom Kelly	November 30, 2001
TO:	DATE
C. Davis (CD)	November 30, 2001

1. THE CONTRACTOR SUBMITTALS LISTED BELOW ARE FORWARDED FOR YOUR REVIEW AND RECOMMENDATIONS.
   (a) APPLY APPROPRIATE STAMP IMPRINT TO EACH SUBMITTAL AND INDICATE REVIEW COMMENTS, AS REQUIRED.
   (b) RETAIN ONE (1) COPY OF THIS TRANSMITTAL FORM AND RETURN REMAINING COPIES WITH REVIEWED SUBMITTALS TO ROICC.
2. THESE SUBMITTALS SHOULD BE RETURNED TO THIS OFFICE BY _____
3. NO RESPONSE REQUIRED _____

COPY TO:

[x] D. ZARI (1 COPY) [X] J. KOLICIUS (1 COPY), S. BEEBE (1 COPY) [X] FREEHOLD SOIL CONSERVATION DISTRICT (3 COPIES)

11/30/2001
SIGNATURE AND DATE

FROM: DESIGNER	DATE
TO: ROICC	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE RETURNED, WITH ACTION TAKEN AS INDICATED.
2. _____

COPY TO:

[ ] ROICC [ ] DESIGNER

SIGNATURE AND DATE

FROM: ROICC	DATE
TO: CONTRACTOR	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE APPROVED/DISAPPROVED AS SHOWN BELOW AND ON EACH STAMP IMPRINT.

COPY TO:
[ ] ROICC [ ] OTHER

FOR COMMANDING OFFICER, ENGINEERING FIELD ACTIVITY – NORTHEAST, NAVAL FACILITIES ENGINEERING COMMAND — DATE

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
3	SD-08, Statements; REVISED Soil Erosion and Sediment Control Plan Report – Site 10	R. Woodworth			Submittal includes: Calculations & Drawings

FOSTER WHEELER ENVIRONMENTAL CORPORATION

November 30, 2001

Mr. Ben Shotland
Resource Conservationist II
Freehold Soil Conservation District
211 Freehold Road
Manalapan, New Jersey 07726

RE: Navy Weapons Station Earle – Site 10
Colts Neck, Monmouth County, New Jersey
FSCD Reference Number 2001-0535

Dear Mr. Shotland,

This letter serves to address the items mentioned in the Freehold Soil Conservation District's (FSCD's), "Initial Review Letter", dated September 28, 2001. Further, this letter serves to transmit information and supporting documentation regarding a design modification made to the proposed drainage swale located on the eastern side of Site 10.

Review of the September 28, 2001 "Initial Review Letter" notes a single item which was determined to be deficient. This item involves the submittal fee for the initial Soil Erosion and Sediment Control Plan Application. According to the September 28, 2001 letter, the FSCD is requesting that the Department of the Navy submit the balance of $450.00 for the application fee.

As discussed during our pre-submission meeting and as per the FSCD's Pricing Schedule, dated June 2000, for Mining, Quarrying, Landfill & Storage Activities at a site between 5,000 square feet and 25 acres, the initial application fee requires a Review and Certification Fee of $335.00 and a Inspection and Enforcement Fee of $450.00. Based on these fees, on August 29, 2001, a check in the amount of $785.00 was submitted to the FSCD along with the initial Soil Erosion and Sediment Control Plan Application. As per a telephone conversation held between Foster Wheeler Environmental Corporation (FWENC) and yourself, it appears that an error was made by the FSCD in the preparation of the Initial Review Letter and the correct fee of $785.00 was submitted. Therefore, it does not appear that any further consideration to Item 1 of the September 28, 2001 Initial Review Letter is warranted at this time.

As previously stated, this letter also serves to alert the FSCD and seek approval of a design change associated with the proposed drainage swale located on the eastern side of the subject site. As you are aware, a grass lined swale was initially proposed to be constructed along the eastern side of the subject site to collect and direct stormwater to undeveloped wooded areas located to the north of the subject site. The swale was designed to have a trapezoidal section including a bottom width of one-foot (1'), a top width of five-feet (5') and side slopes of two (2) horizontal to one (1) vertical (i.e., 2:1). The design depth of the swale is one foot (1'). After consideration of potential problems associated with the maintenance of a grass lined swale at a large Naval facility such as Earle, FWENC proposes to line the swale with filter fabric and a six-inch (6") layer of three-inch (3") diameter riprap. Please note, the design dimensions of the proposed swale will not change due to the modification to the lining system.

2300 Lincoln Highway East, One Oxford Valley, Suite 200, Langhorne, PA 19047-1829
Phone (215) 702-4000 Fax (215) 702-4045

As depicted in the attached calculations, a swale with the aforementioned design parameters can handle a flow of 7.26 cubic feet per second (ft^3/s). This capacity greatly exceeds the anticipated flow from a 25-year design storm of 2.62 ft^3/s.

With regard to concerns over an increase in off-site flow, as shown in the Soil Erosion and Sediment Control Plan Report dated August 29, 2001, the existing conditions at the site in this drainage area (EDA-1) are subject to off-site flows of 27.38 ft^3/s during the 25-year storm event. Under the proposed conditions, utilizing a riprap lined swale, drainge area PDA-1 will be subject to an off-site flow of 28.78 ft^3/s. This increase is flow represents a 4.9% increase in off-site flow during the 25-year storm event. FWENC believes this increase in flow to be insignificant. Further, as stated in the August 29, 2001 Soil Erosion and Sediment Control Plan Report, all areas located downgradient of the discharge point and the remainder of Site 10 that will be subject to this insignificant increase in off-site stormwater flow, consist of undeveloped wooded areas owned by the Navy. The stormwater and design calculations referenced above are attached to this letter.

In addition, due to the change in proposed swale lining (i.e., riprap versus grass) and the design water depth anticipated in the swale during the 25-year storm event (i.e., 0.632 feet), the size of the conduit outlet protection apron will change. Based on the attached calculations, the new apron will have the following dimensions:

Length of Apron (L_a) = 6' (formerly proposed to be 8')
Width 1 = 15' (no change from previous proposal)
Width 2 = 21' (formerly proposed to be 23')

Revised construction details associated with the riprap lining of the proposed swale channel and the conduit outlet protection apron are shown on the attached Revised Soil Erosion and Sediment Control Plans. Please note, the remainder of the design parameters associated with the soil erosion and sediment control measures to be implemented with regard to the proposed project remain as stated in the initial Soil Erosion and Sediment Control Plan Application submittal.

Please review the enclosed documents and contact FWENC with any questions or comments. If you should have any questions, comments or require any additional information, please do not hesitate to contact me at (973) 630-8224. For you convenience, I can be reached via electronic mail at kbogatch@fwenc.com. FWENC's facsimile number is (973) 630-8474.

Very truly yours,
FOSTER WHEELER ENVIRONMENTAL CORPORATION

Keith J. Bogatch, P.E.
Senior Civil Engineer

w/enclosures

cc: R. Woodworth (FWENC)

I:\bogatchk\Earle Navy Base\Freehold Resp Ltr Site 10.doc

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ENGINEERING CALCULATION COVER SHEET

U.S. Naval Weapons Station – Earle
Landfill Capping OU-6
Site 10
Colts Neck, New Jersey

Prepared for:

Department of the Navy
EFA – Northeast
10 Industrial Highway
Lester, Pennsylvania

Prepared by:

Foster Wheeler Environmental Corporation
Langhorne, Pennsylvania

CALCULATIONS:

Drainage Calculations

Prepared under the Supervision of:

11/30/01

Keith J. Bogatch
New Jersey P.E. License No. 40369

Revision	Prepared by	Reviewed by	Approved by	Date	Pages Affected
1	D. Martoccia	K. Bogatch	K. Bogatch	Nov. 30, 2001	All

2300 LINCOLN HIGHWAY EAST, ONE OXFORD VALLEY, SUITE 200, LANGHORNE, PA 19047-1829
PHONE (215) 702-4000 FAX (215) 702-4045

Worksheet 2: Runoff curve number and runoff

Project	By	Date
NAVY - EARLE	KJB	10/5/01
Location	**Checked**	**Date**
SITE 10 - CL (PDA-1)	DHM	10/6/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
TOPSOIL (B)	TOP OF LANDFILL, GRASS (30,028 SQ. FT.)	61			0.69	42.09
LANDFILL COVER (B)	RIP RAP TOE OF SLOPE (5,201 SQ. FT.)	85			0.12	10.20
ATSION SAND (C)	CLEARED, GRUBBED, REVEG. (4,458 SQ. FT.)	74			0.10	7.40
ATSION SAND (C)	WOOD-GRASS COMBINATION (9,441 SQ. FT.)	76			0.22	16.72

[1] Use only one CN source per line

Totals ➡ 1.13 | 76.41

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{76.41}{1.13} = 67.62$; Use CN ➡ 68

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.90	2.06	2.62

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

(CALCS ON BACK)

Back of Worksheet 2

$$S = \frac{1000}{CN} - 10 = \frac{1000}{68} - 10 = 4.71$$

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

- FOR TWO YEAR STORM - $P = 3.5''$

$$Q = \frac{(3.5 - 0.2(4.71))^2}{3.5 + 0.8(4.71)} = 0.90 \text{ IN.}$$

- FOR TEN YEAR STORM - $P = 5.25''$

$$Q = \frac{(5.25 - 0.2(4.71))^2}{5.25 + 0.8(4.71)} = 2.06 \text{ IN}$$

- FOR TWENTY-FIVE YEAR STORM - $P = 6.0''$

$$Q = \frac{(6.0 - 0.2(4.71))^2}{(6.0 + 0.8(4.71))} = 2.62 \text{ IN.}$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - FBRC	KJB	10/5/01
Location	**Checked**	**Date**
SITE 10 - Q1 (PDA-1)	DMM	10/6/01

Check one: ☐ Present ☒ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID	AB	BC	CD	EF	
1. Surface description (table 3-1)	DENSE GRASS	RIPRAP 6"	DENSE GRASS	RIPRAP 3"	
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.035	0.25	0.032	
3. Flow length, L (total L † 300 ft) ft	100	8	15	15	
4. Two-year 24-hour rainfall, P_2 in	←	3.5	→		
5. Land slope, s ft/ft	0.06	0.625	0.5	0.006	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.15	0.002 +	0.04	0.016	= 0.182

Shallow concentrated flow

Segment ID	FG		
7. Surface description (paved or unpaved)	WOODS / LIGHT UNDERBRUSH		
8. Flow length, L ft	100		
9. Watercourse slope, s ft/ft	0.006		
10. Average velocity, V (figure 3-1) ft/s	1.2		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.023	+	= 0.023

Channel flow

Segment ID	DE		
12. Cross sectional flow area, a ft^2	3.0		
13. Wetted perimeter, p_w ft	5.48		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	0.55		
15 Channel slope, s ft/ft	0.006		
16. Manning's roughness coefficient, n	0.032		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	2.42		
18. Flow length, L ft	515		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.059	+	= 0.059
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr			0.264

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 10/5/01 SHEET 2 OF 2

CHKD. BY DMM DATE 10/6/01 OFS NO. DEPT. NO.

CLIENT NAVY-EFDSW

PROJECT SITE 10

SUBJECT ADEQUACY OF PROPOSED SWALE

ADEQUACY CHECK

Q_{25} FROM TR-55 = 2.62 FT^3/S

Q_{FULL} = 7.26 FT/S

$\therefore$ $Q_{FULL} \gg Q_{25}$

$7.26 \gg 2.62$

$\therefore$ SWALE DESIGN IS ADEQUATE

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 10/5/01 SHEET 1 OF 1

CHKD. BY DMM DATE 10/6/01 OFS NO. DEPT. NO.

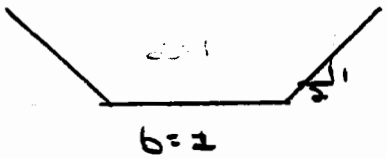
CLIENT NAVY - EARLE

PROJECT SITE 10

SUBJECT SWALE FREEBOARD CHECK

I - FIND DEPTH OF FLOW IN SWALE FOR Q_{25}

- Q_{25} FROM TR-55 EQUALS 2.62 FT^3/S



$A = \frac{1}{2} d (a+b)$

$A = \frac{1}{2} d (2d + 2d + 1 + 1)$

$A = \frac{1}{2} d (4d + 2)$

$A = 2d^2 + 1$

$WP = 2.24d + 1 + 2.24d$

$= 4.48d + 1$

$R = \frac{A}{WP} = \frac{2d^2+1}{4.48d+1}$

$n = 0.032$ RIP RAP LINING

$S = 0.006\ FT/FT$

$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$2.62 = \frac{1.49}{0.032} (2d^2+1) \left(\frac{2d^2+1}{4.48d+1}\right)^{2/3} (0.006)^{1/2}$

$\therefore d = 0.632'$ → DESIGN DEPTH = 1.0'

FREEBOARD = 1.0 - 0.632 = 0.368'

FROM STANDARD 20 - LINED WATERWAYS

- FREEBOARD ≥ 0.25'

$0.368' > 0.25'$ ∴ DESIGN IS ADEQUATE

FOSTER WHEELER ENVIRONMENTAL CORPORATION

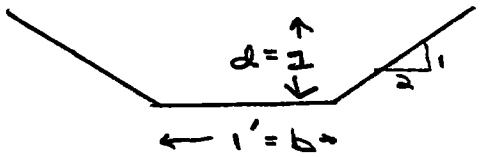
BY KJB DATE 10/5/01 SHEET 1 OF 1

CHKD. BY DMM DATE 10/6/01 OFS NO. DEPT. NO.

CLIENT NAVY - EARLE

PROJECT SITE 10

SUBJECT RIP RAP DESIGN FOR SWALE



DESIGN 'n' = 0.032

$S = 0.006$ FT/FT

$Q_{25} = 2.62$ FT³/S

- FROM STANDARD 23 OF THE NJSESC MANUAL

I. CALCULATE b/d RATIO

- $b/d = 1/1 = 1$

II. OBTAIN P/R RATIO FROM CURVE 23-2 USING b/d = 1

∴ P/R = 9.5

III OBTAIN d_{50} FROM CURVE 23-3A USING

S = 0.006

Q = 2.62 FT³/S

P/R = 9.5

OR $d_{50} = 12(118 Q S^{13/6} R/P)^{2/5}$

$= 12(118(2.62)(0.006^{13/6})(1/9.5))^{2/5}$

$d_{50} = 0.58''$, say 3"

IV FROM CURVE 23-1, ACTUAL 'n' FOR $d_{50} = 3''$ IS

n = 0.0315

∴ DESIGN ≈ ACTUAL

0.032 ≈ 0.0315

THICKNESS - AS FILTER FABRIC WILL BE USED, THICKNESS IS EQUAL TO $2 \times d_{50}$

$= 2 \times 3'' = 6''$ THICK.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 11/6/01 SHEET 1 OF 1

CHKD. BY DMM DATE 11/6/01 OFS NO. DEPT. NO.

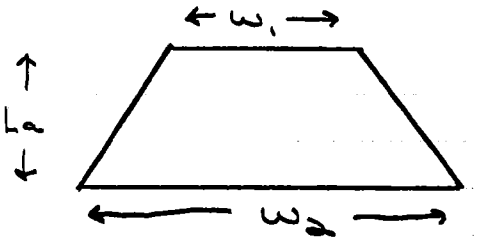
CLIENT NAVY-EARLE

PROJECT SITE 10 -

SUBJECT CONDUIT OUTLET PROTECTION

- USING STANDARD 12 OF THE NJSESC STANDARDS

- Q_{25} (TR-55) NO SURFACE = 2.67 FT^3/S



- FIND LENGTH OF APRON (La)

$L_a = 1.8(q/D_o^{1/2}) + 7D_o$

D_o FOR 25 YR STORM = 0.632'

$W_b = 5'$

$q = Q_{25}/W_b = 2.67/5 = 0.53$

$\therefore L_a = 1.8\left(\frac{0.53}{0.632^{1/2}}\right) + 7(0.632) = 5.62' = 6'$

WIDTH 1 $(W_1) = 3W_b = 3(5) = 15'$

WIDTH 2 $(W_2) = 3W_b + L_a = 15 + 6' = 21'$

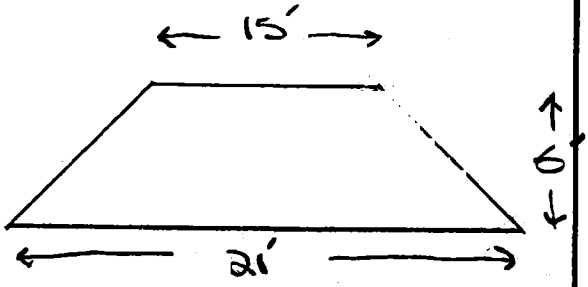
MEDIAN STONE DIAMETER (d_{50})

$d_{50} = \frac{0.016}{0.2D_o} q^{1.33} = \frac{0.016}{0.2(0.632)} (0.53)^{1.33} = 0.05''$

- USE 3" Φ

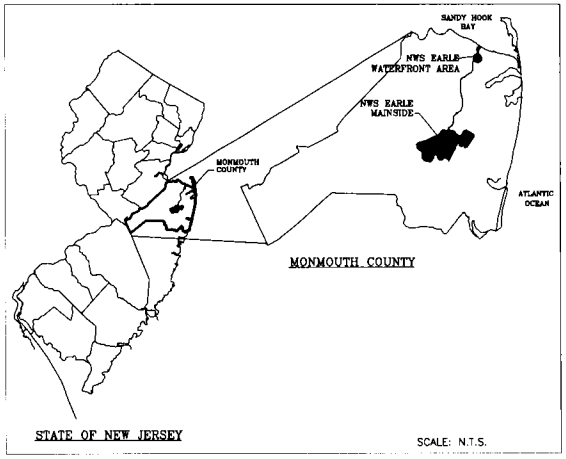
THICKNESS = $2D_{50} = 2(3) = 6''$

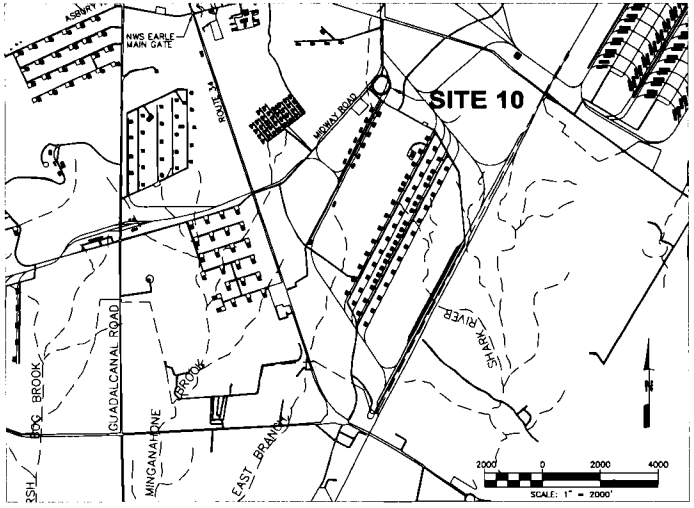
WITH USE OF FILTER FABRIC



REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 10
COLTS NECK, MONMOUTH COUNTY, NEW JERSEY
RAC CONTRACT NO. N62472-99-D-0032

DRAWING INDEX:





FOSTER WHEELER ENVIRONMENTAL

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 10
TITLE SHEET

CONTRACT NO. N62472-99-D-0032

SHEET 1 OF 7

SIZE: D DWG. NO. T-1

GENERAL NOTES

1. EXISTING TOPOGRAPHIC DATA IS BASED ON FIELD SURVEYS PERFORMED BY BOUCHER & JAMES, INC., DOYLESTOWN, PA IN JUNE 2001. SEE SHEET C-3 FOR EXISTING SITE CONDITIONS.
2. HORIZONTAL DATUM BASED UPON NEW JERSEY STATE PLANE COORDINATES NAD83 AND VERTICAL DATUM BASED UPON NAVD88 AS FURNISHED BY RESIDENT OFFICER IN CHARGE OF CONSTRUCTION OFFICE AT THE NAVAL WEAPONS STATION – EARLE FOR THE FOLLOWING MONITORING WELLS:

WELL ID	NORTH	EAST	TOP OF OUTER CASING
MW10-06	519268.74	592712.39	108.60
MW10-07	519230.86	592807.94	108.20

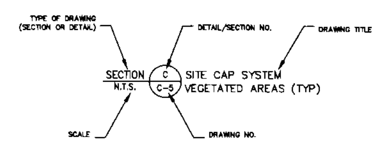
3. ELEVATIONS ARE BASED ON MEAN SEA LEVEL DATUM NAVD88.
4. THE CONTOURS SHOWN HEREIN ARE AT 1 FOOT INTERVALS. SEE SHEETS C-3, C-4 AND C-5.
5. THE REMEDIAL ACTION CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING HORIZONTAL AND VERTICAL CONTROLS FOR THE LANDFILL CAP CONSTRUCTION THROUGHOUT THE DURATION OF THE PROJECT.
6. ALL WORK FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS; APPLICABLE SECTIONS OF THE NEW JERSEY DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, DATED 1996; AND THE STANDARDS FOR SOIL EROSION AND SEDIMENT IN NEW JERSEY, ADOPTED JULY 1999. ALL METHODS OF WORK FOR THIS PROJECT SHALL ALSO COMPLY WITH FEDERAL, STATE OF NEW JERSEY, AND LOCAL ORDINANCES, UNLESS OTHERWISE NOTED IN THE CONTRACT DRAWINGS AND SPECIFICATIONS.
7. THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER A MINIMUM OF THREE WORKING DAYS PRIOR TO INTRUSIVE ACTIVITIES AT SITE 10 TO ALLOW TIME FOR COORDINATION WITH APPROPRIATE BASE PERSONNEL AND TO ENSURE THAT ALL PROCEDURES ARE IN COMPLIANCE.
8. THE CONTRACTOR SHALL CONTACT THE "NJ ONE CALL SYSTEM" A MINIMUM OF FIVE AND MAXIMUM OF TEN WORKING DAYS PRIOR TO ANY INTRUSIVE ACTIVITIES. THE PHONE NUMBER IS 1-800-272-1000. UTILITIES SHOWN ON THE DRAWINGS ARE BASED UPON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY AND ALLOW FOR THEIR LOCATIONS. IF A UTILITY IS IN CONFLICT, THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER AND APPROPRIATE UTILITY TO RESOLVE THE CONFLICT.
9. THE APPROXIMATE LIMITS OF THE LANDFILL BOUNDARY WERE DETERMINED BY FOSTER WHEELER ENVIRONMENTAL CORPORATION DURING A JUNE 2001 SITE INVESTIGATION SOIL BORING PROGRAM.
10. THE CONTRACTOR SHALL CLEAR TREES AND SHRUBS WITHIN THE LIMITS OF DISTURBANCE. NO TREES AND SHRUBS OUTSIDE THESE LIMITS ARE TO BE DISTURBED WITHOUT AUTHORIZATION BY THE CONTRACTING OFFICER.
11. ADEQUATE SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR, AS PER THE ATTACHED DRAWINGS, PRIOR TO LANDFILL CAP CONSTRUCTION ACTIVITIES. ALL DISTURBED AREAS SHALL BE STABILIZED (HYDROSEEDED, RIPRAPPED, OR COVERED WITH STONE) IMMEDIATELY UPON ESTABLISHING FINAL GRADE.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING ALL WORK TO THE IMMEDIATE PROJECT AREA. ALL AREAS DISTURBED BY THE CONTRACTOR THAT ARE OUTSIDE THE LIMITS OF DISTURBANCE SHALL BE RESTORED TO THE ORIGINAL CONDITIONS BY THE CONTRACTOR AND APPROVED BY THE CONTRACTING OFFICER.
13. FIGURE DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS. CHECK GRAPHIC SCALE BEFORE SCALING DRAWINGS.
14. THE CONTRACTOR SHALL THOROUGHLY INSPECT SITE 10 PRIOR TO CONSTRUCTION TO VERIFY EXISTING SITE CONDITIONS. VERIFICATION OF EXISTING SITE CONDITIONS WILL INCLUDE, BUT NOT BE LIMITED TO, STAKING THE LOCATION OF ALL AREAS TO BE WITHIN THE LIMITS OF DISTURBANCE PRIOR TO ACTUAL WORK. THE FIELD LOCATION STAKES MUST BE REVIEWED AND APPROVED BY THE CONTRACTING OFFICER PRIOR TO DISTURBANCE ACTIVITIES.
15. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING GRADES THAT SUSTAIN POSITIVE DRAINAGE THROUGHOUT LANDFILL CAP CONSTRUCTION ACTIVITIES.
16. THE STABILIZED CONSTRUCTION ENTRANCE FOR SITE 10 SHALL BE THE SOLE POINT FOR SITE INGRESS AND EGRESS. THE CONTRACTOR SHALL CONSTRUCT THE STABILIZED CONSTRUCTION ENTRANCE AT THE LOCATION SHOWN ON SHEET C-4 AND AS PER THE DETAIL ON SHEET C-2.
17. THE LOCATION OF THE CONTRACTOR STAGING AREAS MUST BE APPROVED BY THE CONTRACTING OFFICER AND SHALL NOT CONFLICT WITH TRAFFIC OR PEDESTRIAN FLOW. ALL STAGING AREAS SHALL BE LOCATED WITHIN THE LIMITS OF DISTURBANCE AS DEPICTED ON SHEET C-4.
18. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CONTRACTING OFFICER IN THE EVENT THE PROPOSED LIMITS OF THE CAP REQUIRE DESIGN REVISION OR MODIFICATION.
19. ALL WORK AREAS SHALL BE MAINTAINED FREE FROM DUST AND ODORS.
20. EVIDENCE OF WETLANDS WAS NOT OBSERVED AT OR SURROUNDING SITE 10 DURING DELINEATION INVESTIGATION ACTIVITIES. IN THE EVENT WETLANDS ARE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CEASE WORK IN THESE AREAS AND NOTIFY THE CONTRACTING OFFICER.
21. DRAWINGS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL CONSTRUCTION SHALL BE PERFORMED IN COMPLIANCE WITH THE APPROVED HEALTH AND SAFETY PLAN, IN ACCORDANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT, AND ALL RULES AND REGULATIONS THERETO APPURTENANT.
22. CONTRACTOR SHALL FURNISH SIGNALMENT AND SUCH WARNING SIGNS AS ARE NECESSARY TO PROVIDE ADEQUATE WARNING TO THE PUBLIC OF HIS OPERATIONS.
23. ALL ASPHALT ROADWAYS ARE TO BE SWEPT FREE OF SOIL, SEDIMENT, AND DEBRIS ON A DAILY BASIS AND ADDITIONALLY AS DIRECTED BY THE CONTRACTING OFFICER.
24. THE SITE'S APPROVAL LETTER, APPROVED SOIL EROSION AND SEDIMENT CONTROL PLAN, DAILY LOG BOOKS AND TEST REPORTS SHALL BE AVAILABLE AT THE SITE AT ALL TIMES.
25. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED, WITH PERMISSION OF THE CONTRACTING OFFICER, WITHIN THIRTY (30) DAYS FOLLOWING THE ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE AREAS.
26. FOR FINISHED GRADING, THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS SO AS TO PREVENT WATER FROM STANDING ON THE SURFACE FOR MORE THAN TWENTY FOUR (24) HOURS AFTER THE END OF A RAINFALL EVENT EXCEPT IN DESIGNATED DRAINAGE COURSES AND SWALE FLOW AREAS, WHICH MAY DRAIN AS LONG AS FORTY-EIGHT (48) HOURS AFTER THE END OF A RAINFALL. AREAS DESIGNED TO HAVE STANDING WATER SHALL NOT BE REQUIRED TO MEET THIS REQUIREMENT.
27. THE CONTRACTING OFFICER HAS THE OPTION OF REQUIRING ADDITIONAL SAFETY OR SEDIMENT CONTROL MEASURES, IF DEEMED NECESSARY.

PROPOSED SEQUENCE OF CONSTRUCTION AT SITE 10

TASK	DURATION (WORKING DAYS)
1. MOBILIZE SITE	2
2. SWEEP THE WORK AREA FOR UNEXPLODED ORDINANCES	2
3. INSTALL SOIL EROSION AND SEDIMENT CONTROL MEASURES	6
4. CLEARING AND GRUBBING OF SITE WITHIN LIMITS OF DISTURBANCE	2
5. PERFORM TEST PIT OPERATIONS AND CONDUCT SITE SURVEY	4
6. CONSTRUCT AND STABILIZE TEMPORARY SITE ACCESS ROADS	6
7. PLACE AND GRADE SUBGRADE	5
8. CONSTRUCT LANDFILL CAP	10
9. CONSTRUCT PERMANENT SECURITY FENCING	2
10. SEED SITE AND CONDUCT FINAL SITE SURVEY	6
11. DEMOBILIZE SITE AND REMOVE SOIL EROSION AND SEDIMENT CONTROL MEASURES	3

NOTE: TASKS ON SITE 10 TO BE PERFORMED BETWEEN 3/01/02 AND 7/01/02 (SUBJECT TO CHANGE PENDING SIGNING OF THE RECORD OF DECISION).

KEY △1



FOSTER WHEELER ENVIRONMENTAL

REV. 1 – ADDITION OF KEY LEGEND

DEPARTMENT OF THE NAVY – NAVAL FACILITIES ENGINEERING COMMAND

EPA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10
GENERAL NOTES AND PROPOSED SEQUENCE OF CONSTRUCTION

KEITH BOGATCH, P.E.

SAT TO | DATE 11/30/01

CODE I.D. NO.

SCALE : NONE

SPEC. NO.

CONSTR. CONTR. NO. N62472-99-D-0032

NAVFAC DRAWING NO.

SHEET 2 OF 7

SIZE: D | DWG. SH. NO. C-1

NAVYRAC\EARLE\SITES3&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_10_C1.DWG

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN THIRTY (30) DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
3. PERMANENT VEGETATION TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING. MULCHING IS REQUIRED ON ALL SEEDING. WHEN HYDROSEEDING, MULCH SHALL NOT BE INCLUDED IN THE TANK WITH THE SEED.
4. ALL WORK TO BE DONE IN ACCORDANCE WITH THE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL OF NEW JERSEY.
5. A SUBBASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUBBASE SHALL BE INSTALLED WITHIN FIFTEEN (15) DAYS OF THE PRELIMINARY GRADING.
6. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE A TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
7. ANY SLOPES GREATER THAN 3H:1V RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION CONTINUES.
8. THE STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A STONE PAD OF 1 1/2" TO 2" STONE, AT ALL CONSTRUCTION DRIVEWAYS, IMMEDIATELY AFTER INITIAL SITE DISTURBANCE.
9. IN ACCORDANCE WITH THE STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A pH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE COVERED WITH A MINIMUM OF TWELVE (12) INCHES OF SOIL HAVING A pH OF 5 OR MORE PRIOR TO SEED BED PREPARATION. AREAS WHERE TREES OR SHRUBS ARE TO BE PLANTED SHALL BE COVERED WITH A MINIMUM OF TWENTY-FOUR (24) INCHES OF SOIL HAVING A pH OF 5 OR MORE.
10. THE FREEHOLD SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED SEVENTY-TWO (72) HOURS IN ADVANCE OF ANY LAND DISTURBING ACTIVITY.
11. AT THE TIME THE SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER, SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NONVEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION SHALL BE EMPLOYED.
12. IN THAT N.J.S.A. 4:24-39 ET. SEQ. REQUIRES THAT NO CERTIFICATES OF OCCUPANCY BE ISSUED BEFORE THE PROVISIONS OF THE CERTIFIED PLAN FOR EROSION CONTROL HAVE BEEN COMPLIED WITH FOR PERMANENT MEASURES, ALL SITE WORK FOR SITE PLANS AND ALL WORK AROUND INDIVIDUAL LOTS IN SUBDIVISIONS, SHALL BE COMPLETED PRIOR TO THE DISTRICT ISSUING A REPORT OF COMPLIANCE FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY BY THE MUNICIPALITY.
13. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
14. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLANS SHALL REQUIRE THE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RECERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
15. UNFILTERED DEWATERING IS NOT PERMITTED. TAKE ALL NECESSARY PRECAUTIONS DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH STATE STANDARDS.
16. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE SHALL BE SPRINKLED UNTIL THE SURFACE IS WET, TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED IN ACCORDANCE WITH STATE STANDARDS FOR EROSION CONTROL.
17. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHTS-OF-WAY SHALL BE REMOVED IMMEDIATELY.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EROSION OR SEDIMENTATION THAT MAY OCCUR BELOW STORMWATER OUTFALLS OR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.
19. STOCKPILE AND STAGING LOCATIONS DETERMINED IN THE FIELD SHALL BE PLACED WITHIN THE LIMIT OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN. STAGING AND STOCKPILES NOT LOCATED WITHIN THE LIMIT OF DISTURBANCE SHALL REQUIRE CERTIFICATION OF A REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN. THE DISTRICT RESERVES THE RIGHT TO DETERMINE WHEN CERTIFICATION OF A NEW AND SEPARATE SOIL EROSION AND SEDIMENT CONTROL PLAN IS REQUIRED FOR THESE ACTIVITIES.
20. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE #2.

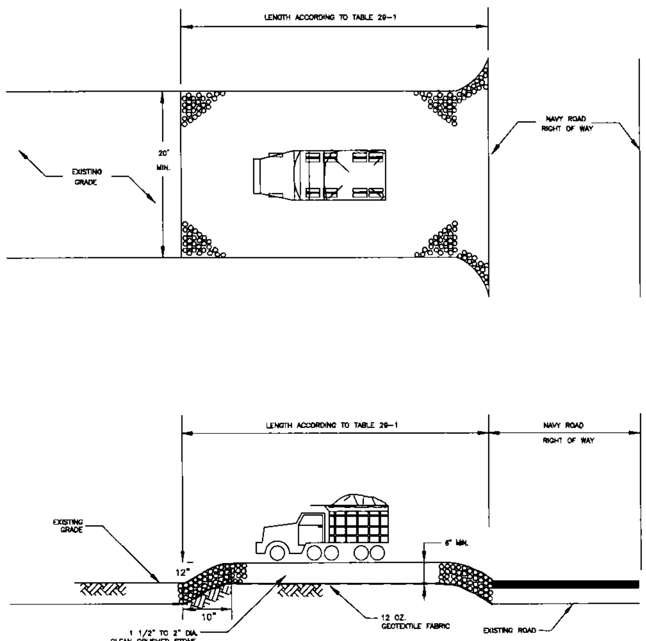
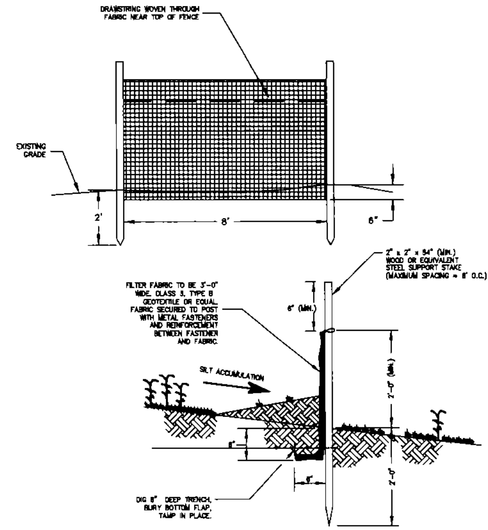


TABLE 29-1. LENGTHS OF CONSTRUCTION EXITS ON SLOPING ROADBEDS

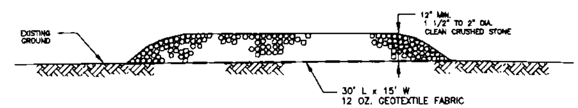
PERCENT SLOPE OF ROADWAY	LENGTH OF STONE REQUIRED	
	COARSE GRAINED SOILS	FINE GRAINED SOILS
0 TO 2%	50 FT.	100 FT.
2 TO 5%	100 FT.	200 FT.
>5%	ENTIRE SURFACE STABILIZED WITH FABC BASE COURSE[1]	

1. AS PRESCRIBED BY LOCAL ORDINANCE OR OTHER GOVERNING AUTHORITY.

DETAIL 1/C-4 STABILIZED CONSTRUCTION ACCESS/EGRESS PLAN VIEW AND SECTION
N.T.S.



DETAIL 2/C-4 SILT FENCE CONSTRUCTION AND INSTALLATION (TYP)
N.T.S.



DETAIL 3/C-4 DECONTAMINATION PAD DETAIL
N.T.S.

TEMPORARY SEEDING SPECIFICATIONS

ZONE 7 a, b SEED MIXTURE* (FROM TABLE 7-2 NEW JERSEY SESC STANDARDS)				FERTILIZER RATE (10-20-10)	LIME RATE
SPECIES	APPLICATION RATE (LB/AC)	SEEDING DATES	SEEDING DEPTH**		
PERENNIAL RYE GRASS	100 LB/AC	2/15 - 5/1 8/15 - 10/15	1/2 INCH	500 LB/AC (11 LB/1000 S.F.)	90 LB/1000 S.F.
PEARL MILLET	20 LB/AC	5/1 - 9/1	1.0 INCH		

* SEE TABLE 7-2 NEW JERSEY STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL FOR SPECIES SUITABLE FOR PLANTING OTHER THAN THOSE SPECIFIED IN THE TABLE ABOVE.

** TWICE THE DEPTH FOR SANDY SOIL.

A) APPLY GROUND LIMESTONE AT A RATE OF 90 LB PER 1000 S.F.
B) APPLY FERTILIZER (10-20-10) AT A RATE OF 11 LB PER 1000 S.F.
C) APPLY PERENNIAL RYEGRASS SEED AT 100 LB PER ACRE AND PEARL MILLET AT 20 LB PER ACRE.
D) APPLY HAY OR STRAW MULCH AT A RATE OF 90 LB PER 1000 S.F.
E) APPLY A LIQUID MULCH BINDER OR TACK TO STRAW OR HAY MULCH.

PERMANENT SEEDING SPECIFICATIONS

UNITED STATES DEPARTMENT OF THE NAVY SEED MIXTURE				FERTILIZER RATE (10-20-10)	LIME RATE
SPECIES	APPLICATION RATE (LB/AC)	SEEDING DATES	SEEDING DEPTH		
TALL FESCUE	75 LB/AC	3/15 - 4/30 8/15 - 9/30	1/4 - 1/2 INCH	870 LB/AC (20 LB/1000 S.F.)	2,178 LB/AC (50 LB/1000 S.F.)
SERICEA LESPEDEZA	60 LB/AC	3/15 - 4/30 8/15 - 9/30	1/4 - 1/2 INCH		

A) APPLY TOPSOIL TO A DEPTH OF 6 INCHES (UNCOMPACTED).
B) APPLY GROUND LIMESTONE AT A RATE OF 50 LB PER 1000 S.F. AND WORK FOUR INCHES INTO SOIL.
C) APPLY FERTILIZER (10-20-10) AT A RATE OF 20 LB PER 1000 S.F.
D) APPLY TALL FESCUE SEED AT 75 LB PER ACRE AND SERICEA LESPEDEZA AT 60 LB PER ACRE.
E) APPLY HAY OR STRAW MULCH AT A RATE OF 90 LB PER 1000 S.F.
F) APPLY A LIQUID MULCH BINDER OR TACK TO STRAW OR HAY MULCH.

DUST CONTROL NOTES

MATERIAL	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLON/ACRE
LATEX EMULSION	12.5:1	FINE SPRAY	235
RESIN IN WATER	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLON/ACRE
POLYACRYLAMIDE (PAM)-SPRY ON POLYACRYLAMIDE (PAM)-DRY SPRAY	APPLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS MAY ALSO BE USED AS AN ADDITIVE TO SEDIMENT BASINS TO FLOCCULATE AND PRECIPITATE SUSPENDED COLLOIDS. SEE SEDIMENT BASIN STANDARD		
ACIDULATED SOY BEAN SOAP STICK	NONE	COARSE SPRAY	1200

DUST CONTROL NOTES

THE FOLLOWING METHODS SHOULD BE CONSIDERED FOR CONTROLLING DUST:
A. MULCHES - SEE STANDARD FOR STABILIZATION WITH MULCHES
B. VEGETATIVE COVER - SEE STANDARD FOR TEMPORARY VEGETATIVE COVER, PERMANENT VEGETATIVE COVER FOR SOIL STABILIZATION, AND PERMANENT STABILIZATION WITH SOD.
C. SPRAY-ON ADHESIVES - ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS). KEEP TRAFFIC OFF THESE AREAS.
D. TILLAGE - TO ROUGHEN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS SPACED ABOUT 12 INCHES APART, AND SPRING-TOOTHED HARROWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.
E. SPRINKLING - SITE IS SPRINKLED UNTIL THE SURFACE IS WET.
F. BARRIERS - SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY, AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING.
G. CALCIUM CHLORIDE - SHALL BE IN THE FORM OF LOOSE, DRY GRANULATES OF FLAKES FINE ENOUGH TO FEED THROUGH COMMONLY USED SPREADERS AT A RATE THAT WILL KEEP SURFACE MOIST BUT NOT CAUSE POLLUTION OR PLANT DAMAGE. IF USED ON STEEPER SLOPES, THEN USE OTHER PRACTICES TO PREVENT WASHING INTO STREAMS, OR ACCUMULATION AROUND PLANTS.
H. STONE - COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL.

FOSTER WHEELER ENVIRONMENTAL

REV. | DESCRIPTION | PREP BY | DATE | APPRVD

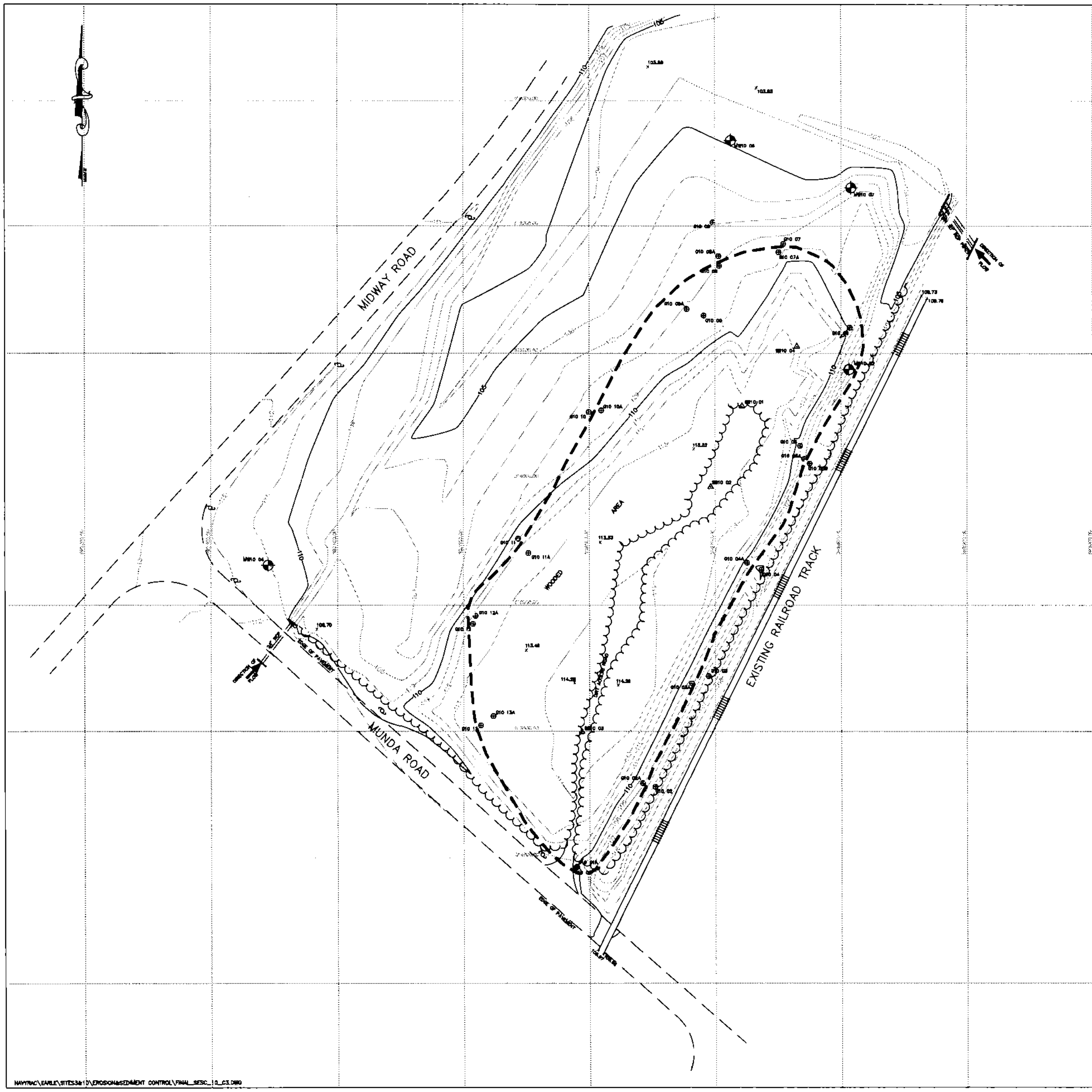
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
LESTER, PENNSYLVANIA
COLTS NECK, NEW JERSEY

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 10
SOIL EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

APPROVED | DATE | EFNE FOR COMMANDER, NAVFAC

KEITH BOGATCH, P.E.
NJPE NO. 40388
SAT TO | DATE 11/30/01
CODE I.D. NO.
SCALE : N.T.S.
SPEC. NO.
CONSTR. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET 3 OF 7
SIZE: D | DWG. SH. NO. C-2

NAVYRAC\EARLE\SITES5&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_10_C2.DWG



LEGEND:

Symbol	Description
△ OR ⊕	EXISTING SOIL BORING
⊕	EXISTING MONITORING WELL
x 113.33	EXISTING SPOT ELEVATION
▬ ▬ ▬	APPROXIMATE LANDFILL BOUNDARY
	TREELINE
	EXISTING UTILITY POLE
- - - -	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
RCP	EXISTING REINFORCED CONCRETE PIPE
	EXISTING RAILROAD TRACKS
— — —	EXISTING ROAD

0 40 80 120

SCALE: 1" = 40'

SOURCE:

TOPOGRAPHIC PLAN – SITE NO. 3, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

FOSTER WHEELER ENVIRONMENTAL

REV. | DESCRIPTION | PREP BY | DATE | APPRVD

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10
EXISTING SITE CONDITIONS

KEITH BOGATCH, P.E.
NJPE NO. 40369

SAT TO | DATE 11/30/01

CODE I.D. NO.

SCALE : 1"=40'

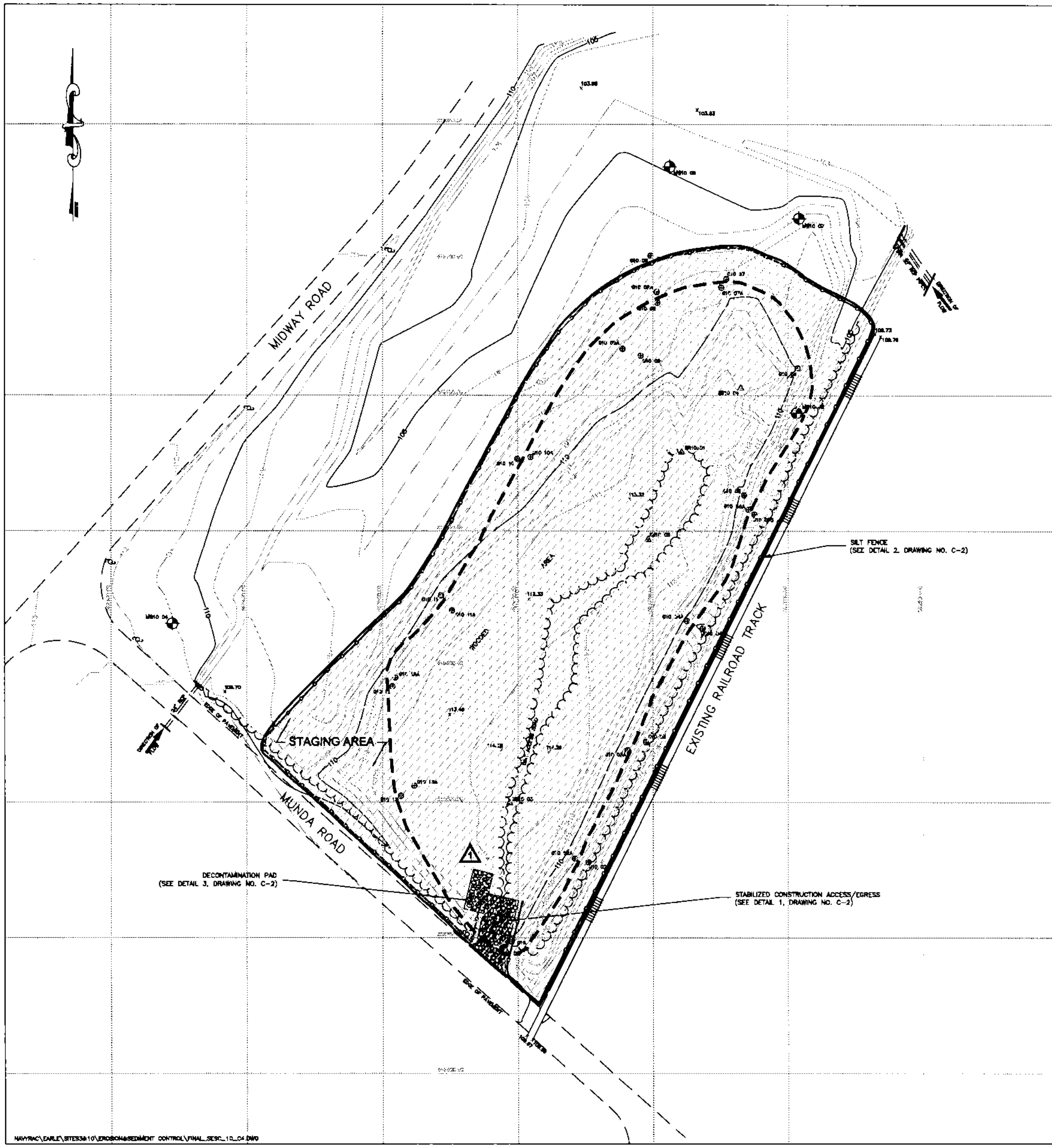
SPEC. NO.

CONSTR. CONTR. NO.
N62472-99-D-0032

NAVFAC DRAWING NO.

SHEET 4 OF 7

SIZE: D | DS. SH. NO. C-3



NOTE:

1. SILT FENCE IS LOCATED APPROXIMATELY 1' WITHIN LIMIT OF DISTURBANCE LINE.

LEGEND

Symbol	Description
△ OR ⊕	EXISTING SOIL BORING
	EXISTING MONITORING WELL
x113.33	EXISTING SPOT ELEVATION
	APPROXIMATE LANDFILL BOUNDARY
	TREELINE
	EXISTING UTILITY POLE
	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	SILT FENCE
	LIMITS OF DISTURBANCE
	AREA TO BE CLEARED AND GRUBBED
RCP	EXISTING REINFORCED CONCRETE PIPE
	EXISTING RAILROAD TRACKS
	EXISTING ROAD

0 40 80 120

SCALE: 1"=40'

SOURCE:

TOPOGRAPHIC PLAN – SITE NO. 3, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

REV.	DESCRIPTION	PREP BY	DATE	APPRVD
1	RE-ORIENTATION OF DECONTAMINATION PAD			

FOSTER WHEELER ENVIRONMENTAL

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
PENNSYLVANIA
NEW JERSEY

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10
CLEARING & GRUBBING, AND EROSION & SEDIMENT CONTROL MEASURES

KEVIN BOGATCH, P.E.
NJPE NO. 40300

DATE 11/30/01

CODE I.D. NO.

SCALE: 1"=40'

SPEC. NO.

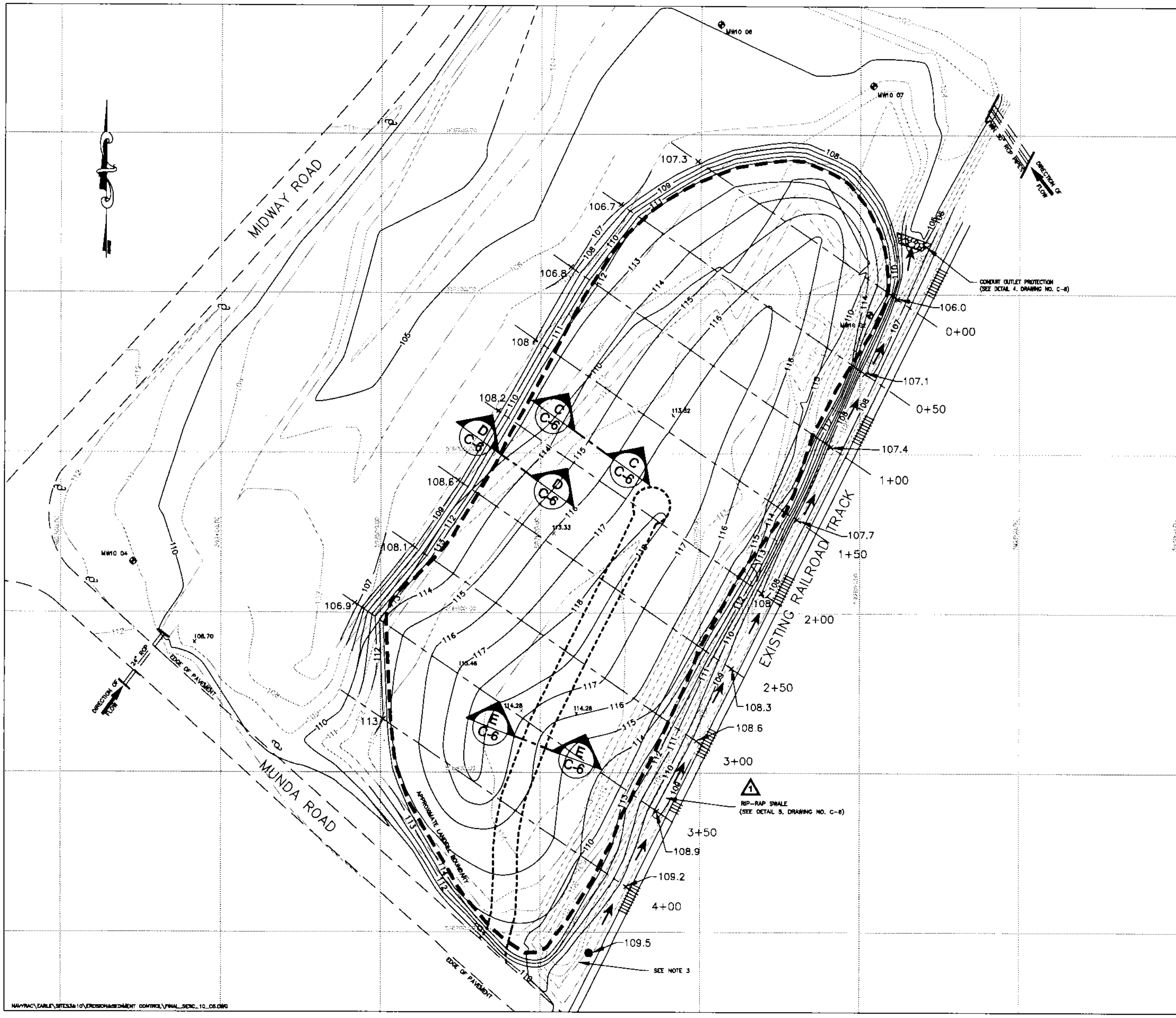
CONSTR. CONTR. NO. N62472-99-D-0032

NAVFAC DRAWING NO.

SHEET 6 OF 7

SIZE: D

DWG. SH. NO. C-4



NOTES:

1. THE PROPOSED DRAINAGE SWALE SHALL HAVE A MINIMUM OF 0.5% SLOPE ALONG THE CENTERLINE.
2. THE CONTRACTOR SHALL MAINTAIN A MINIMUM DEPTH OF 1.0 FEET IN THE PROPOSED DRAINAGE SWALE.
3. THE CONTRACTOR SHALL USE COVER SOIL TO FILL THE TOPOGRAPHICALLY DEPRESSED AREA LOCATED IN THE SOUTHEASTERN CORNER OF THE LANDFILL.
4. THE PROPOSED RIP-RAP SWALE SHALL START AT PROPOSED SPOT ELEVATION 109.5 AND CONTINUE TO THE CONDUIT OUTLET PROTECTION.

LEGEND:

- EXISTING MONITORING WELL
- EXISTING UTILITY POLE
- SPOT ELEVATION
- SECTION LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FINAL CONTOUR
- APPROXIMATE LANDFILL BOUNDARY
- × 107.8 TOE OF SLOPE SPOT ELEVATION
- 109.5 PROPOSED SPOT ELEVATION
- DIRECTION OF FLOW IN SWALE
- EXISTING RAILROAD TRACKS
- EXISTING ROAD
- PROPOSED PERMANENT ACCESS ROAD
- RCP EXISTING REINFORCED CONCRETE PIPE

0 30 60 90
SCALE: 1"=30'

SOURCE:
TOPOGRAPHIC PLAN - SITE NO. 10, BOUCHER AND JAMES, INC., DOYLESTOWN, PA, DRAWN: JPD, CHECKED: CJB, SHEET: 1 OF 1, DATE: JUNE 22, 2001.

REV.	DESCRIPTION	PREP BY	DATE	APPRVD
1	SWALE LINING CHANGED FROM GRASS TO RIP-RAP			

FOSTER WHEELER ENVIRONMENTAL

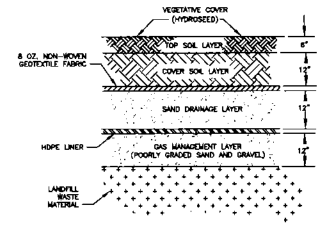
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
PENNSYLVANIA / NEW JERSEY

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 10
FINAL GRADING PLAN

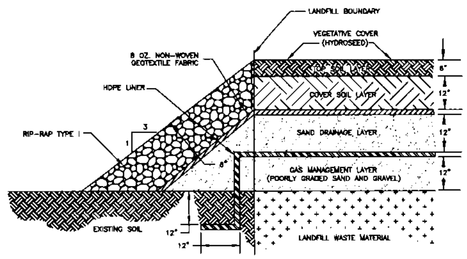
SEAL AREA

KEITH BOBATCH, P.E.
NJPE NO. 40388

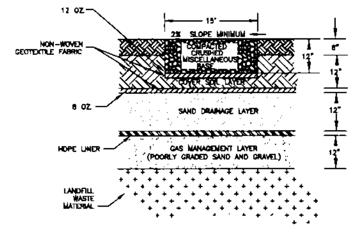
DATE 11/30/01
SCALE: 1"=30'
CONSTR. CONTR. NO. N62472-99-D-0032
SHEET 6 OF 7
SIZE: D
DWG. SH. NO. C-5



SECTION (C / C-5) SITE CAP SYSTEM
N.T.S. VEGETATED AREAS (TYP)



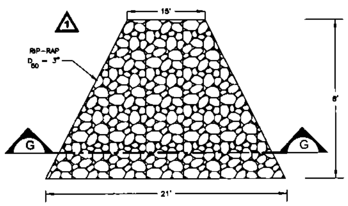
SECTION (D / C-5) SITE CAP SYSTEM
N.T.S. CAP TOE DRAIN TERMINATION (TYP)



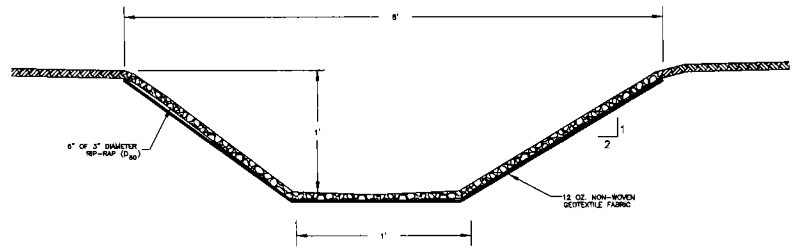
SECTION (E / C-5) SITE ACCESS ROAD
N.T.S. WITHIN LANDFILL (TYP)

NOTE:

1. THE CONTRACTOR SHALL GRADE THE SIDE SLOPES OF THE PROPOSED DRAINAGE SWALE INTO THE RIP-RAP CONDUIT OUTLET PROTECTION. SIDE SLOPES OF THE DRAINAGE SWALE SHALL BE PROTECTED AGAINST EROSION AT THE CONDUIT OUTLET PROTECTION APRON WITH 6 INCHES OF RIP-RAP.

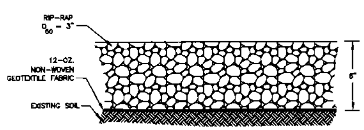


DETAIL (4 / C-5) CONDUIT OUTLET PROTECTION (TYP)
N.T.S. PLAN VIEW



1

DETAIL (5 / C-5) SITE CAP SYSTEM
N.T.S. DRAINAGE SWALE (TYP)



SECTION (G) CONDUIT OUTLET PROTECTION (TYP)
N.T.S.

FOSTER WHEELER ENVIRONMENTAL

REV.	DESCRIPTION	PREP BY	DATE	APPRVD
1	SWALE LINING CHANGED FROM GRASS TO RIP-RAP			

EFA NORTHEAST

REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 10
CAP SECTIONS AND DETAILS AND STORMWATER MANAGEMENT DETAILS

KEITH BOGATCH, P.E.
NJPE NO. 40380

SAT TO — DATE 11/30/01

CODE I.D. NO.

SCALE : N.T.S.

SPEC. NO.

CONSTR. CONTR. NO. N62472-99-D-0032

NAVFAC DRAWING NO.

SHEET 7 OF 7

SIZE: D — DWG. SH. NO. C-6

NAVYRAC\EARLE\SITES3&10\EROSION&SEDIMENT CONTROL\FINAL_SESC_10_C6.DWG

Prepare in quintuplicate (original and 4 copies)

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
NORTHNAVFACENGCOM 4335/3 (Rev. 6/80)

CONTROL NO. 003A

CONTRACT NO.	DELIVERY ORDER #	ACTIVITY LOCATION
N62472-99-D-0032	**0040**	**NWS Earle, Colts Neck, New Jersey**

PROJECT TITLE:
Landfill Capping OU-6, Sites 3 & 10

FROM:	DATE
Foster Wheeler Environmental Corp. – Program QCM: Mark Miller	August 28, 2001
TO:	DATE
C. Davis (1copy)	August 28, 2001

1. THE CONTRACTOR SUBMITTALS LISTED BELOW ARE FORWARDED FOR YOUR REVIEW AND RECOMMENDATIONS.
   (a) APPLY APPROPRIATE STAMP IMPRINT TO EACH SUBMITTAL AND INDICATE REVIEW COMMENTS, AS REQUIRED.
   (b) RETAIN ONE (1) COPY OF THIS TRANSMITTAL FORM AND RETURN REMAINING COPIES WITH REVIEWED SUBMITTALS TO ROICC.
2. THESE SUBMITTALS SHOULD BE RETURNED TO THIS OFFICE BY _____
3. NO RESPONSE REQUIRED _____

COPY TO:

[x] G. GOEPFERT (1 COPY) [X] J. KOLICIUS (2 COPIES [X] FREEHOLD SOIL CONSERVATION DISTRICT (4 COPIES)

8/28/2001
SIGNATURE AND DATE

FROM: DESIGNER	DATE
TO: ROICC	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE RETURNED, WITH ACTION TAKEN AS INDICATED.
2. _____

COPY TO:

[ ] ROICC [ ] DESIGNER

SIGNATURE AND DATE

FROM: ROICC	DATE
TO: CONTRACTOR	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE APPROVED/DISAPPROVED AS SHOWN BELOW AND ON EACH STAMP IMPRINT.

COPY TO:
[ ] ROICC [ ] OTHER

FOR COMMANDING OFFICER, ENGINEERING FIELD ACTIVITY – NORTHEAST, NAVAL FACILITIES ENGINEERING COMMAND — DATE

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
3	SD-08, Statements; Soil Erosion and Sediment Control Plan Report – Site 10	R. Woodworth			Submittal includes: Report & Drawings

SOIL EROSION AND SEDIMENT CONTROL PLAN REPORT

- FOR -

Navy Weapons Station Earle – Site 10
Colts Neck, Monmouth County, New Jersey

Submitted by:

Department of the Navy
Engineering Field Activity, Northeast
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania

Prepared by:

Foster Wheeler Environmental Corporation
2300 Lincoln Highway East
One Oxford Valley, Suite 200
Langhorne, Pennsylvania 19047-1829

AUGUST 29, 2001

Keith J. Bogatch, P.E.
NJPE #40369
FOSTER WHEELER ENVIRONMENTAL CORPORATION

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1.0 INTRODUCTION

Foster Wheeler Environmental Corporation (FWENC) has been retained by the Department of the Navy, under Contract Task Order N62472-99-D-0032 CTO No. 40, to prepare a Soil Erosion and Sediment Control Plan for the remedial actions to be conducted at Site 10 of the Navy Weapons Station (NWS) Earle. This Soil Erosion and Sediment Control Plan Report (hereinafter referred to as the "SESC Plan Report") has been prepared for the capping of a former landfill located on Site 10 in accordance with an approved closure plan and a United States Environmental Protection Agency (USEPA), Record of Decision (ROD), for this site.

1.1 Background

The NWS Earle, commissioned in 1943 to supply ammunition to the naval fleet, is located in Monmouth County, New Jersey. The NWS Earle is located approximately 47 miles south of New York City. The location of the NWS Earle is depicted on Figure 1 included in Appendix A of this report. The NWS Earle consists of two areas (i.e., the Mainside Area and the Waterfront Area) which are interconnected via a Navy-controlled right-of-way and access road.

The Mainside Area is located in Colts Neck Township, Monmouth County, New Jersey. Site 10 (hereinafter referred to as the "subject site") is located in the Mainside Area. The location of Site 10 is depicted on Figure 2 included in Appendix A of this report.

The subject site encompasses approximately two (2) acres of land that is reported to have been utilized from 1953 to 1965 for the disposal of demilitarized munitions cases (i.e., a scrap metal landfill). As stated in a document entitled Proposed Plan for Site 3 and 10 (OU-6), Naval Weapons Station Earle, Colts Neck, New Jersey dated May 2001 and prepared by Terra Tech Nus, Inc, there is no historical evidence that any live ammunition was disposed of at the subject site. During the period of operation, only certified-inert materials were reported to have been disposed in the landfill. An estimated 65,000 cubic yards of waste materials, which includes cover materials, is reported to consist mainly of aluminum and steel containers. Spent grit and paint chips from ammunition re-work operations were also reported to be deposited in the landfill area. The landfill cover materials are reported to consist primarily of sandy soils.

A description of the on-site soils is presented in Section 3.0 of this SESC Plan Report. The site is currently vegetated with grasses and scrub pines, with the exception of an access road and an open, disturbed, vehicle turn-around area, where no vegetation exists. Since cessation of disposal activities at this site, the sandy soil cover has eroded and portions of the landfill contents have been uncovered.

In 1990, the NWS Earle was placed on the USEPA's National Priorities List (NPL). Several rounds of assessment (human health risks, ecological risks) and investigation (site, remedial, etc.) activities were conducted at the station. Due to similar characteristics, Site 10, along with another landfill site (i.e., Site 3), were grouped together, into a single operable unit (i.e., Operable Unit Six (OU-6). Based on the results of these assessments, investigations and the objective to protect human health and the environment, remedial alternatives to address Site 10 were developed and assessed. A summary of the assessments, investigations and remedial alternative analyses is presented in the May 2001 Proposed Plan document.

Based on analysis of the remedial alternatives developed for Site 10, the Department of the Navy, in conjunction with the USEPA and the New Jersey Department of Environmental Protection (NJDEP), selected a remedial alternative to address the former landfill. The chosen remedial alternative consists of the capping of the landfill, the erection of a cable-type wire fence with appropriate warning signs around the perimeter of the landfill area, the establishment of institutional controls (i.e., restrictions attached to the Station Master Plan to limit future use and disturbance of the landfill) and the long term monitoring and maintenance of the landfill surface. The construction of the cap over the landfill area as well as the erection of the cable-type wire fence will act as containment measures and serve to restrict human access to the wastes in the landfill area. The institutional controls would limit exposure to the landfills contents.

1.2 SESC Plan Organization

This SESC Plan Report provides the basis for the establishment of soil erosion and sediment control measures to be implemented at the subject site during the construction of the chosen remedial alternative (i.e., landfill cap) as well as long term. The SESC Plan Report describes the proposed measures and procedures for controlling soil erosion at the subject site. The SESC Plan Report contains the following sections:

- Section 1.0 – INTRODUCTION: This section provides a brief summary of the subject site and the history of the landfill located on same.
- Section 2.0 – PROJECT DESCRIPTION: This section provides a brief description of the remedial activities (i.e., construction activities) to be implemented at the on-site landfill and the subject site.
- Section 3.0 – EXISTING SITE CONDITIONS: This section of the SESC Plan Report details the current conditions at the subject site including a description of the on-site soils and the existing drainage areas.
- Section 4.0 – PROPOSED SITE CONDITIONS: This section of the SESC Plan Report details the conditions of the site, including the newly established drainage areas, after the construction of the proposed remedial actions (i.e., capping of the on-site landfill).
- Section 5.0 – DRAINAGE AREA COMPARISON (EXISTING VERSUS PROPOSED PEAK FLOWS): This section of the SESC Plan Report discusses the comparison of the existing peak flows in each drainage area with the proposed peak flows established after construction of the proposed project. This section also includes the rationale for the proposed stabilization methods to be employed to prevent adverse effects to the site and off-site areas from erosional forces.
- Section 6.0 – PROPOSED SOIL EROSION AND SEDIMENT CONTROL MEASURES): This section of the SESC Plan Report discusses the proposed soil erosion and sediment control (temporary and permanent) measures to be implemented at the site during the construction activities, as well as long term, to prevent adverse effects from erosional forces (i.e., wind, water, etc.).

- Section 7.0 – PROPOSED SEQUENCE OF CONSTRUCTION: This section of the SESC Plan Report presents the proposed Sequence of Construction for the proposed on-site activities, as well as their durations, to be implemented at the subject site.

- Section 8.0 – REFERENCES: This section of the SESC Plan Report presents the references to publications utilized during the preparation of this SESC Plan Report as well as the associated Soil Erosion and Sediment Control Plans.

1.3 SESC Plan Preparation

This SESC Plan is being submitted to satisfy the substantive portions of the Standards for Soil Erosion and Sediment Control in New Jersey, adopted July 1999 and the Soil Erosion and Sediment Control Act of 1975 as amended (N.J.S.A. 4:24-39 et. seq.) and the New Jersey Administrative Code (N.J.A.C. 2:90-1.1 et. seq.)

2.0 PROJECT DESCRIPTION

As previously stated, based on the results of several rounds of assessment, investigation and analysis performed by the Navy, a remedial alternative, as stated in the ROD, consisting of the capping of the existing landfill, establishment of institutional controls and long term monitoring of the cap, has been developed to address the closure of the former on-site scrap metal landfill. As stated in the May 2001 Proposed Plan document, the landfill cap will serve to prevent potential human and wildlife contact with the landfill materials, reduce contaminant leaching to groundwater and limit contaminant migration via surface runoff and erosion.

In addition, the perimeter of the landfill will be fenced and warning signs will be posted to limit access to the former landfill area. Land use restrictions will be placed on the subject site to limit future uses and development that may result in disturbance of the soil cover or direct contact with contaminated media. These land use restrictions will also prohibit the use of untreated groundwater as drinking water.

The landfill cap design is as follows:

- a twelve inch (12") gas management layer, consisting of poorly graded sand and gravel, will be placed over the graded existing soils/wastes;
- a geomembrane and a geotextile fabric will be placed over the gas management layer;
- a drainage layer, consisting of a twelve inch (12") layer of sand will be placed over the geotextile;
- a second layer of geotextile will be placed over the sand drainage layer and will act to keep the drainage layer free from fines, which would clog the drainage layer;
- a twelve inch (12") soil cover layer will be placed over the sand drainage layer and the geotextile fabric; and,
- a six-inch (6") topsoil layer will complete the proposed landfill cap. The top soil layer will be hydroseeded to establish permanent vegetative cover.

The cap system design consists of a "standard"-type mounded cap. As illustrated on Drawing C-5 of the Soil Erosion and Sediment Control Plans, this type of capping system consists of a topographically high point in the central area of the cap that divides the landfill area into two drainage quadrants. The eastern quadrant of the landfill area slopes towards the eastern exterior of the landfill area. A perimeter swale will be constructed along the eastern side of the landfill to collect stormwater runoff from the eastern portion of the landfill. The swale will direct stormwater to the existing low-lying, undeveloped, wooded areas to the north of the subject site.

The western quadrant of the landfill area will be constructed to direct stormwater, via topography, to the low-lying areas to the west of the landfill. These low-lying areas form a natural, topographic "swale" which directs stormwater to the existing low-lying, undeveloped, wooded areas to the north of the landfill area.

3.0 EXISTING SITE CONDITIONS

The former scrap metal landfill located on the subject site encompasses an area of approximately two (2) acres. The aerial extent of the landfill was determined through the performance of a soil boring program conducted by FWENC during site investigation activities in June 2001. The approximate limits of the landfill area are shown on a site plan, Figure 3, included in Appendix A of this report as well as Drawings C-3, C-4 and C-5 of the Soil Erosion and Sediment Control Plans.

The subject site is generally surrounded by undeveloped wooded areas. Areas to the north of the subject site consist of undeveloped, wooded areas. To the east of the subject site is a Navy-owned and operated railroad corridor beyond which are undeveloped, wooded areas. To the south of the subject site is Munda Road beyond which are additional undeveloped, wooded areas. Undeveloped wooded areas are located immediately adjacent to (west of) the landfill area beyond which is Midway Road. Further to the west of Midway Road are additional undeveloped, wooded areas. It should be noted, all of the surrounding areas are located on the Naval Weapons Station Earle. Visual reconnaissance of the subject site notes the site to generally slope from south to north. Low-lying, depressed land areas (i.e., a land areas located at lower elevations than their surrounding areas) are located along the eastern and western sides of the subject site. The low-lying eastern area is located between the existing landfill limits and the existing railroad tracks to the east of the subject site. Visual inspection of this area notes that a high point exists in the middle of the area that separates overland stormwater flow collected in this area into northern and southern components. The northern stormwater flow component appears to follow the natural topography of the eastern portion of the site and discharges this collected stormwater onto the undeveloped woodlands located to the north of the subject site. The southern stormwater flow component appears to pond in a naturally low area located along the southeastern corner of the subject site.

The western depressed lowland area is located in the wooded area to the west of the landfill area. This area topographically parallels Midway Road and slopes in a south to north direction. Stormwater flow which enters this area is directed to the undeveloped wooded areas to the north of the subject site.

Three stormwater drainage pipes are noted to discharge onto the subject site. The locations of the three pipes are noted on Figure 3 included in Appendix A of this report as well as Drawings C-3, C-4 and C-5 of the Soil Erosion and Sediment Control Plans. The first two pipes are located to the northeast of the landfill limits and consist of two thirty-inch (30") diameter reinforced concrete pipes (RCPs). The two pipes appear to collect stormwater from the areas to the east of the railroad tracks and transfer the stormwater, under the railroad corridor, and onto Site 10. Flow from these pipes appears to be directed, via natural topography, to the undeveloped wooded areas located to the north of the landfill area.

The third stormwater pipe, a twenty-four inch (24") diameter RCP, is located to the southwest of the landfill limits and extends underneath Munda Road. This pipe appears to collect stormwater from the undeveloped and wooded areas located to the south of Munda Road and directs the collected stormwater, under Munda Road, onto Site 10. Flow from this pipe appears to be

directed, through the aforementioned low lying land area located to the west of the landfill limits, to the wooded areas to the north of Site 10.

3.1 Critical Areas

Critical areas are those that pose potentially serious soil erosion problems due to the presence of steep slopes, poor vegetative cover or potentially high surface water velocities. Currently, a single potentially critical area exists on the subject site. This area is associated with the slope leading from the site to the adjacent railroad tracks. As the implementation of the proposed site work will involve modifications to this slope, the newly graded slope will be stabilized by seeding the final grade of same with permanent vegetation.

3.2 Wetlands

A site reconnaissance was performed by a representative of FWENC on June 6, 2001 to confirm the presence/absence of wetland areas within the site limits. Field conditions at the time of the site reconnaissance noted the site to consist primarily of a forested area over sandy fill materials. Vegetation on the site was noted to consist of pitch pines, red oak species, black cherry saplings and black huckleberrys. The on-site soils were determined not to be hydrophytic. Soils were noted to consist of a grayish-brown, sandy surface layer over yellowish brown sand and were determined to be non-hydric. No evidence of wetland hydrology was observed within the limits of Site 10. Therefore, Site 10 was determined to be non-wetland.

3.3 Flood Plains

Based on review of available information as well as data gained during site investigation/site reconnaissance activities, no portions of Site 10 are located within the 100-year flood plain area.

3.4 On-Site Soils

Review of the Soil Survey of Monmouth County, New Jersey dated 1989, as prepared by the United States Department of Agriculture (USDA), Soil Conservation Service, notes the following soil series to be underlying the subject site: the Lakehurst Series, the Atsion Series and the Udorthents Series. The limits of these soil series, as they appear on Site 10, are depicted on a portion of the Monmouth County soil map, Figure 4, included in Appendix A of this SESC Plan Report. Each series and appropriate mapping unit that covers Site 10 are described in detail below.

The Lakehurst series soils, mapped as Lakehurst sand are nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Typically, the surface layer is gray sand 4 inches thick. The subsurface layer is light gray sand six inches (6") thick. The subsoil is twenty-six inches (26") thick. It is brown loamy sand to a depth of thirteen inches (13"). In the next layer it is mottled, brownish yellow sand to a depth of twenty-four inches (24") inches. Below that, it is mottled, pale brown sand to a depth of thirty-six inches (36"). The substratum is mottled, light brownish gray sand to a depth of sixty inches (60") or more. Permeability of this Lakehurst soil is rapid in the subsoil and the substratum. The available water capacity is low. The apparent seasonal high water table depth of 1 ½ to 3 ½ feet from January to April. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a

severe hazard. Most areas of this soil consist of woodlands. A very small acreage is used for pasture and farming. This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, rapid permeability, and the seasonal high water table. The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, cutbanks caving, and sandiness.

Atsion series soils, mapped as Atsion sand, are nearly level, poorly drained soils in depressional areas and on broad flats. Typically, the surface layer is eight inches (8") thick. The uppermost two inches (2") is matted, partly decomposed organic material and roots, and below that is black sand. The subsurface layer is grayish brown sand fourteen inches (14") thick. The subsoil is eighteen inches (18") thick. It is dark reddish brown loamy sand of thirty inches (30"). Below that, it is mottled, brown sand to a depth of forty inches (40"). The substratum is mottled, yellowish brown fine sand to a depth of sixty inches (60") or more. Permeability of the Atsion soil is moderately rapid or rapid in the subsoil and rapid in the substratum. The available water capacity is low. The apparent seasonal high water table is between the surface and a depth of one foot (1') from November to June. Runoff is very slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid. Most areas of this soil are wooded; a few acres are used for blueberries. The main limitation to use this soil as site for dwellings and some other types of community development is the seasonal high water table.

Udorthents series soils, mapped as Udorthents, smoothed, are areas of soils that have been altered by excavating or filling. These areas exist throughout Monmouth County but are predominately located in larger urban areas. These units are irregular is shape and typically range from ten (10) to one hundred (100) acres in area. When located in filled area, these soils typically consist of loamy materials that are more than twenty inches (20") thick. These areas are typically located on flood plains, in tidal marshes and on areas of moderately well drained to very poorly drained soils. This series includes soils that contain materials such as concrete, asphalt, metal and glass.

3.5 Existing On-Site Drainage Areas

Based on review of topographical maps, site surveys and other information concerning the subject site, it appears that with the exception of the aforementioned stormwater drainage pipes (i.e., two 30" RCP and one 24" RCP) which transfer stormwater from adjacent areas onto the subject site, the site is isolated from off-site drainage flow patterns. The site is bounded to the north by undeveloped wooded areas located at lower elevations than noted on the subject site. Based on the fact that the topographic gradient in this area is to the north, no overland stormwater flow would impact the subject site from the areas to the north.

The subject site is bounded to the east by a railroad corridor beyond which are undeveloped, wooded areas. The railroad tracks are situated on an elevated soil mound. Based on the elevation of the mound in comparison to the subject site and the adjacent areas, overland flow from the areas to the east of the site will not impact the subject site.

The subject site is bound to the south and west by Munda Road and Midway Road, respectively. Based on the elevation of these roads with respect to the subject site, it does not appear that overland stormwater flow from the areas to the south and west of the subject site will impact the subject site.

Based on the above and the existing topography of the subject site, the site consists primarily of three drainage areas. The first drainage area (i.e., EDA-1) is located in the northeastern portion of the site and includes the stormwater flow from the twin 30" RCPs, a portion of the overland flow from the railroad corridor embankment and the northeastern portion of the existing landfill. Overland stormwater flow from the landfill area is directed to the northern portion of the existing low lying land areas located between the landfill limits and the existing railroad embankment. Stormwater collected in this low lying area is directed, via the land topography, in a northerly direction and joins the flow from the two 30" RCPs. At this point, the stormwater flow combines with other overland flow and is directed, via existing topography, to the undeveloped wooded areas located to the north of the subject site. EDA-1 encompasses an area of approximately 31,550 square feet (sq. ft.).

The second drainage area (i.e., EDA-2) is located in the southeastern corner of the subject site. This area includes the southeastern portion of the existing landfill and the overland flow from the remaining (southern) portion of the railroad corridor. Flow in this drainage area is directed into a natural "pond" type area located along the southern corner of the landfill area. EDA-2 encompasses an area of approximately 24,625 sq. ft.

The third drainage area (i.e., EDA-3) encompasses the western portion of the landfill area as well as the western portion of the site. This drainage area includes stormwater flow from the existing 24" RCP that extends underneath Munda Road in the southwestern corner of the subject site. This pipe transmits stormwater flow from the undeveloped wooded areas to the south of the site, under Munda Road, and into an existing land depression located along the western portion of the subject site. In addition to transferring flow from the 24" RCP, this depression directs overland stormwater flow from the western portion of the landfill and the western portion of the subject site, via natural site topography, in a northerly direction to the undeveloped wooded areas located to the north of Site 10. EDA-3 encompasses an area of approximately 53,625 sq. ft.

The limits of the three drainage areas (i.e., EDA-1, EDA-2 and EDA-3 are depicted on a site plan, Figure 5, included in Appendix A of this report.

3.6 Existing On-Site Overland Flows

Utilizing the existing drainage area information, the existing conditions located on the site and the USDA, National Resource Conservation Service, Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55), the peak discharge flow for each of the drainage areas were calculated. The flows were calculated utilizing the values for the two (2), ten (10) and twenty-five (25) year storm events. The following table summarizes the peak flows in each drainage area for each of the storm events.

4.0 PROPOSED SITE CONDITIONS

Implementation of the proposed remedial actions (i.e., capping of the landfill site) will result in the clearing and grubbing of existing vegetation and the installation of soil coverings not indigenous to the subject site (i.e., placement of the capping system, top soil and the establishment of permanent vegetation on the landfill). These proposed activities will result in the establishment of new drainage areas. The proposed grading of the subject site after construction of the soil cap and associated stormwater swale, is shown on Drawing C-5 of the Soil Erosion and Sediment Control Plans

4.1 Critical Areas

The implementation of the proposed project will create a single new critical area. This area is associated with the discharge point of the proposed stormwater swale to be constructed on the eastern side of the landfill area. In order to address this critical area, conduit outlet protection, consisting of the construction of a rip-rap horizontal apron, has been designed to prevent potential erosion problems stemming from this discharge. A discussion of the design of the apron is presented in Section 6.5 of this SESC Plan Report. Details of the apron design are also presented on Drawing C-6 of the Soil Erosion and Sediment Control Plans.

4.2 Proposed On-Site Drainage Areas

Based on the proposed topography for the subject site, two proposed drainage areas site (i.e., PDA-1 and PDA-2) will be established on the subject site. Drainage area PDA-1 will consist of a combination of existing drainage areas EDA-1 and EDA-2 (i.e., the eastern portion of the landfill as well as the eastern portion of the subject site). This drainage area will be created by filling in the existing low-lying area located along the southeastern corner of the landfill area. Filling of this low-lying area will be performed to eliminate the ponding of stormwater that occurs during the existing conditions. Stormwater collected in this area will be directed, via a perimeter drainage swale constructed along the eastern side of the landfill area, to an area located along the northeastern corner of the landfill area. At this point, the drainage swale will discharge stormwater, over a horizontal rip rap apron, to a low-lying area. This stormwater flow will join the stormwater flow from the twin 30" diameter stormwater pipes and flow, via natural topography, to the undeveloped, wooded areas to the north of the subject site.

Proposed drainage area PDA-2 will generally mimic existing drainage area EDA-3. Stormwater flow in this area will consist of flow from the western portion of the landfill area, the western portion of the subject site as well as from the aforementioned 24" RCP stormwater pipe. Flow collected in proposed drainage area PDA-2, as with existing drainage area EDA-3, will discharge to the undeveloped, wooded area located to the north of the subject site.

The limits of the two proposed drainage areas (i.e., PDA-1 and PDA-2), based on the proposed topography, are depicted on a site plan, Figure 5, included in Appendix A of this report.

4.3 Proposed On-Site Overland Flows

Utilizing the proposed scenario drainage area information, the proposed conditions located on the site and the USDA, National Resource Conservation Service, Urban Hydrology for Small

Watersheds, Technical Release 55 (TR-55), the peak discharge flow for each of the two proposed drainage areas was calculated. The flows were calculated utilizing values for the two (2), ten (10) and twenty-five (25) year storm events. The following table summarizes the peak flows in each drainage area for each of the storm events.

Drainage Area Number	Acreage (sq. ft.)	Peak Flows (cubic feet per second (cfs))		
		Two Year Storm	Ten Year Storm	Twenty-Five Year Storm
PDA-1 (*)	49,212	26.63	27.31	27.68
PDA-2 (**)	170,096	11.93	14.23	15.44

(*) Drainage area PDA-1 includes a combination of existing drainage areas EDA-1 and EDA-2 as well as the maximum stormwater flow (i.e., the pipes flowing full) from the aforementioned twin 30" diameter RCP stormwater pipes.

(**) Drainage area PDA-2 includes the maximum stormwater flow (i.e., the pipe flowing full) from the aforementioned 24" diameter RCP stormwater pipe.

Please note, all calculations performed to develop the proposed peak discharges including TR-55 Worksheet 2: Runoff Curve Numbers and Runoff, Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t) and Worksheet 4: Graphical Peak Discharge Method are included in Appendix B of this SESC Plan.

5.0 DRAINAGE AREA COMPARISON (EXISTING VERSUS PROPOSED PEAK FLOWS)

To determine the need for stabilization of the two on-site drainage areas, the associated discharge points and their associated land depressions, a comparison of the existing versus proposed conditions was performed. The following table summarizes this comparison.

Drainage Area Number	Acreage (sq. ft.)	Peak Flows (cubic feet per second (cfs))		
		Two Year Storm	Ten Year Storm	Twenty-Five Year Storm
EDA-1+ / PDA-1	28,914 / 49,212	26.61 / 26.63	27.11 / 27.31	27.38 / 27.68
EDA-2 (*)	24,927	No comparison performed. Stormwater flow from this area has been included as a portion of drainage area PDA-1 under the proposed conditions.		
EDA-3 / PDA-2	173,950 / 170,096	12.22 / 11.93	14.61 / 14.23	15.79 / 15.44

(*) Existing drainage area EDA-2 does not have an ultimate discharge point. Stormwater collected in this drainage area ponds in the low-lying areas of drainage area EDA-2. This low lying area acts as a "retention" type stormwater basin. Stormwater flow generated in this area under the proposed conditions is included in the total flow for proposed drainage area PDA-1.

As shown in the above table, a comparison of the peak flows under the existing conditions with the peak flows under the proposed site conditions reveals basically no change in the peak flows to the two site stormwater discharge points. The first site discharge point (i.e., Q_1 associated with existing drainage area EDA-1 and proposed drainage area PDA-1) is subject to peak flows of 26.61 cfs, 27.11 cfs and 27.38 cfs, respectively during the two, ten and twenty-five year storm events under the existing site conditions. Under the proposed site conditions, this discharge point will be subject to a peak flow of 26.63 cfs, 27.31 cfs and 27.68 cfs, respectively during the two, ten and twenty-five year storm events. The change in site conditions (existing versus proposed) will represent a 0.08%, a 0.7% and a 1.1% percent increase in the peak flows between the existing and proposed site conditions. These percentages represent an insignificant change in site flows between the existing and proposed site conditions. Further, it should be noted, all areas located downgradient of this discharge point and Site 10 that will be subject to this insignificant increase on off-site stormwater flow, consist of undeveloped, wooded areas owned by the Department of the Navy and part of the Naval Weapons Station Earle.

The second site discharge point (i.e., Q_2 associated with existing drainage area EDA-3 and proposed drainage area PDA-2) is subject to peak flows of 12.22 cfs, 14.61 cfs and 15.79 cfs, respectively during the two, ten and twenty-five year storm events under the existing site conditions. Under the proposed site conditions, this discharge point will be subject to peak flows of 11.93 cfs, 14.23 cfs and 15.44 cfs, respectively during the two, ten and twenty-five year storm

events. Based on the comparison of the peak flows during the existing and proposed site conditions, the implementation of the proposed project will result in less flow to discharge point Q2 during the proposed site conditions.

Based on the above, it does not appear that the use of any stormwater management basins are necessary to control the rate of stormwater flow from the site. Further, based on the comparison of the existing and proposed peak flows, no enhancement/stabilization of the low lying areas or downstream points appear warranted.

However, based on the fact that the implementation of the proposed remedial alternative will disturb a land area in excess of 5,000 sq. ft. and that the proposed site conditions will concentrate stormwater flow at one of the two site discharge points, soil erosion and sediment control measures, as per the Standard for Soil Erosion in New Jersey dated July 1999, will be employed during the construction activities. These soil erosion and sediment control measures are discussed in the following section of this report and detailed on the Soil Erosion and Sediment Control Plans.

6.0 PROPOSED SOIL EROSION AND SEDIMENT CONTROL MEASURES

Based on the need to minimize soil erosion during the implementation of the project as well as in the long term, the following soil erosion and sediment control measures will be utilized. It should be noted, the locations of the various erosion control measures are depicted on the attached Soil Erosion and Sediment Control Plans.

6.1 Temporary Vegetative Cover for Soil Stabilization

To minimize erosional (wind, water, etc.) effects during the implementation of the proposed remedial actions, all soils exposed for periods of two (2) to six (6) months, not subject to grading, construction activities or immediately scheduled for permanent seeding, will be temporarily seeded until permanent stabilization can be established. Temporary seeding activities will be conducted as per Standard 7-1 of the Soil Erosion and Sediment Control Standards in New Jersey (July 1999) as well as per the Temporary Seeding Specifications noted on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.2 Permanent Vegetative Cover for Soil Stabilization

The establishment of permanent vegetative covers is the final component of the proposed landfill cap. Permanent seeding will be performed as per Standard 4-1 of the Soil Erosion and Sediment Control Standard in New Jersey (July 1999) and as per the notes and details on Drawing C-2 of the Soil Erosion and Sediment Control Plans. However, it should be noted, the Department of the Navy maintains their own specifications regarding seed mixtures for the establishment of permanent seeding/stabilization. This seed mixture is presented on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.3 Top Soil

The final layer of the proposed landfill cap will consist of a six (6) inch layer of top soil. The top soil will be placed and permanently seeded as per the Technical Specification for the project, all applicable sections of the Standard for Soil Erosion and Sediment Control in New Jersey (July 1999) and the notes and details presented on the Soil Erosion and Sediment Control Plans for this project.

6.4 Channel Stabilization

The implementation of the proposed project includes the construction of a single perimeter (eastern) stormwater drainage swale. Due to site constraints associated with the construction of the swale (i.e., located immediately adjacent to the eastern exterior of the landfill and the railroad embankment located along the eastern side of the subject site), the swale will have a trapezoidal section with a base of one foot (1') in width, side slopes of 2H:1V and a design depth of one and one-half feet (1.5'). The swale is proposed to be hydroseeded to establish permanent vegetative cover on the interior of same.

TR-55 and other stormwater calculations were performed to size the swale. The swale was designed based on the peak flow generated from the stormwater calculations in proposed drainage area PDA-1. These calculations are included in Appendix B of this SESC Plan Report. Based on these calculations, it was determined that a maximum peak flow of 1.52 cfs would be realized in the swale (i.e., the peak flow during the twenty-five (25) year storm event in drainage area PDA-1). Utilizing this flow and the cross sectional area of the swale (i.e., three (3) square feet), the maximum velocity in the swale would be 0.44 feet/second (ft/s).

Utilizing Table 11-1 of the Standards for Soil Erosion and Sediment Control in New Jersey (July 1999), the maximum allowable velocity in a grassed lined waterway for sand type soils is 1.8 ft/s. This value also represents the most conservative velocity. As the maximum velocity which would be realized in the proposed swale is 0.44 ft/s and Standard 11-1 allows for a permissible velocity of 1.8 ft/s, it does not appear that the proposed drainage swale will require any additional stabilization measures besides the establishment of permanent vegetation.

6.5 Conduit Outlet Protection

As previously stated in this SESC Plan Report, the single stormwater swale to be constructed on the subject site will discharge to the low lying area located to the north of the subject site via a single discharge point (i.e., Q_1). In order to protect this discharge point from erosional forces, the swale outlet will be equipped with conduit outlet protection. The conduit outlet protection will consist of a horizontal apron constructed of rip-rap with a D_{50} size of four inches (4"). The thickness of the apron will be eight inches (8"). Calculations associated with the sizing of the horizontal apron are included in Appendix A of this SESC Plan Report. Details concerning the size and construction of the apron are shown on Drawing C-6 of the Soil Erosion and Sediment Control Plans.

6.6 Dust Control

As stated in the Standards for Soil Erosion and Sediment Control in New Jersey (July 1999), to prevent blowing and movement of dust from exposed soil surfaces and to reduce on-site and off-site damage and health hazards during construction activities, dust control methods will be employed during the construction of the proposed project as per Standard 16-1. The Contractor will be required to implement one or more of the dust control methods as per Standard 16-1 and the notes and specification shown on Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.7 Grassed Waterway

As previously stated, a single drainage swale is proposed to be constructed at the subject site to collect stormwater runoff from the eastern portion of the landfill area and direct same to the low lying areas located to the north of the subject site. The design of this swale satisfies the substantive portions of the Grassed Waterway Standard. Based on the location of the swale in comparison to the eastern exterior of the landfill and the adjacent railroad corridor, a swale section having a width of less than six feet (6') was necessary. Therefore, the swale will have trapezoidal section and be subject to permanent seeding as

per the Standard for Permanent Vegetative Cover for Soil Stabilization (Standard 4-1). The swale will have a base dimension of one foot (1') in width and side slopes of 2H:1V. Based on the design depth of one and one-half two feet (1 1/2'), the top width of the waterway will be five feet (5'). Based on the maximum velocity that will be realized in the swale (0.44 ft/s as discussed in Section 6.4 of this report), the swale design satisfies the maximum allowable velocity for grassed waterways as specified in Table 18-1 (i.e., maximum of 2.0 ft/s in sand soils).

6.8 Silt Fence

Silt fencing will be installed along the perimeter of the site immediately adjacent to the limits of disturbance as shown on Drawing C-4 of the attached Soil Erosion and Sediment Control Plan. The fencing will be installed in order to intercept runoff from the disturbed areas and prevent silt from migrating off-site with same. The silt fence will be installed, as per Standard 25-1 of the Soil Erosion and Sediment Control Standards in New Jersey (July 1999) as well as the notes and details presented on Drawing C-2, prior to any clearing, grubbing, or excavation activities at the site.

6.9 Stabilized Construction Accessway

Access to the subject site is via a dirt road extending from Munda Road located along the southern and southwestern sides of the subject site. The location of this access road is depicted on Figure 3 included in Appendix A of this report as well as Drawings C-3, C-4 and C-5 of the Soil Erosion and Sediment Control Plans. As such, to reduce tracking or flowing of sediment onto Munda Road, a stabilized construction accessway will be constructed at the site entrance. The accessway will be constructed as per Standard 29-1 of the Soil Erosion and Sediment Control Standards in New Jersey (July 1999) and the notes and details on Drawing C-2 of the Soil Erosion and Sediment Control Plans. The location of the proposed stabilized construction accessway is noted on Figure C-5 of the Soil Erosion and Sediment Control Plans.

6.10 Decontamination Pad

A decontamination pad will be constructed adjacent to the stabilized construction accessway. The pad will be of similar construction to the stabilized construction accessway and will be utilized to remove all soils and sediments from site vehicles prior to same exiting the site. A detail noting the construction of the proposed decontamination pad is included in Drawing C-2 of the Soil Erosion and Sediment Control Plans.

6.11 Best Management Practices

The following management practices will be applied throughout the construction activities:

1. Unstabilized, disturbed areas will be minimized and construction activities will be staged.

2. Seeding or other stabilization measures will follow immediately after grading.

3. Areas, which are not to be disturbed, will be clearly marked by flags, signs, etc.
4. The Navy's Contracting Officer will be responsible for ensuring the installation and maintenance of all soil erosion and sediment control practices.
5. Erosion and sediment control structures will be installed and/or constructed prior to the start of any earth disturbing activities.
6. Erosion and sediment control structures will remain in place until permanent vegetation has become established over disturbed surface.

6.12 Maintenance of Soil Erosion and Sediment

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall event. Any required repairs will be made immediately. The following items will be checked in particular:

- The stabilized construction accessway and the decontamination pad will be maintained in a condition, including the addition of stone or other repairs, which will minimize tracking of sediment onto roads.
- The silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition reaches half of the height of the fabric.
- All seeded areas will be checked regularly to ensure that a good stand is maintained. Areas shall be fertilized, additional top soil placed and re-seeded as needed.

7.0 SEQUENCE OF CONSTRUCTION

The proposed Sequence of Construction is detailed in the following table as well as on Drawing C-1 of the Soil Erosion and Sediment Control Plans:

Task		Duration (Working Days)
(1)	Mobilize Site	2
(2)	Sweep of Work Area for Unexploded Ordinances	2
(3)	Install Soil Erosion and Sediment Control Measures	5
(4)	Clearing and Grubbing of Site within Limits of Disturbance	2
(5)	Perform Test Pit Operations/Conduct Site Survey	4
(6)	Construct/Stabilize Temporary Site Access Roads	5
(7)	Place and Grade Subgrade	5
(8)	Construct Landfill Cap	10
(9)	Construct Permanent Security Fencing	2
(10)	Seed Site/Conduct Final Site Survey	5
(11)	Demobilize Site / Remove Soil Erosion and Sediment Control Measures	3
TOTAL		**48 Working Days**

8.0 REFERENCES

(1) New Jersey State Soil Conservation Committee, 1999. "Standards for Soil Erosion and Sediment Control in New Jersey."

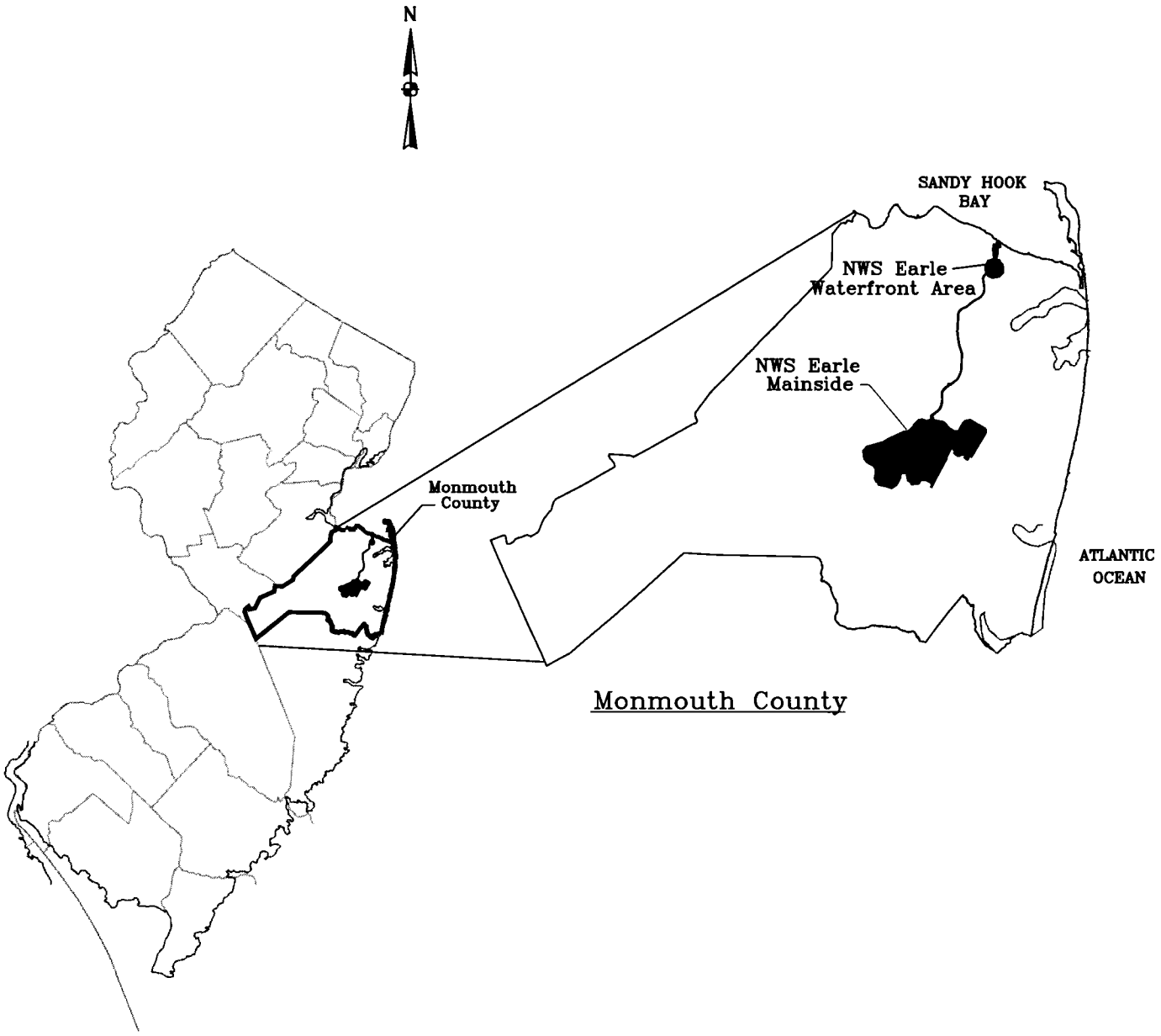
(2) United States Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division, June 1986. "Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55)".

(3) United States Department of Agriculture, Soil Conservation Service, April 1989. "Soil Survey of Monmouth County, New Jersey".

(4) Terra Tech Nus, Inc., May 2001. "Proposed Plan for Site 3 and 10 (OU-6), Naval Weapons Station Earle, Colts Neck, New Jersey".

APPENDIX A

FIGURES

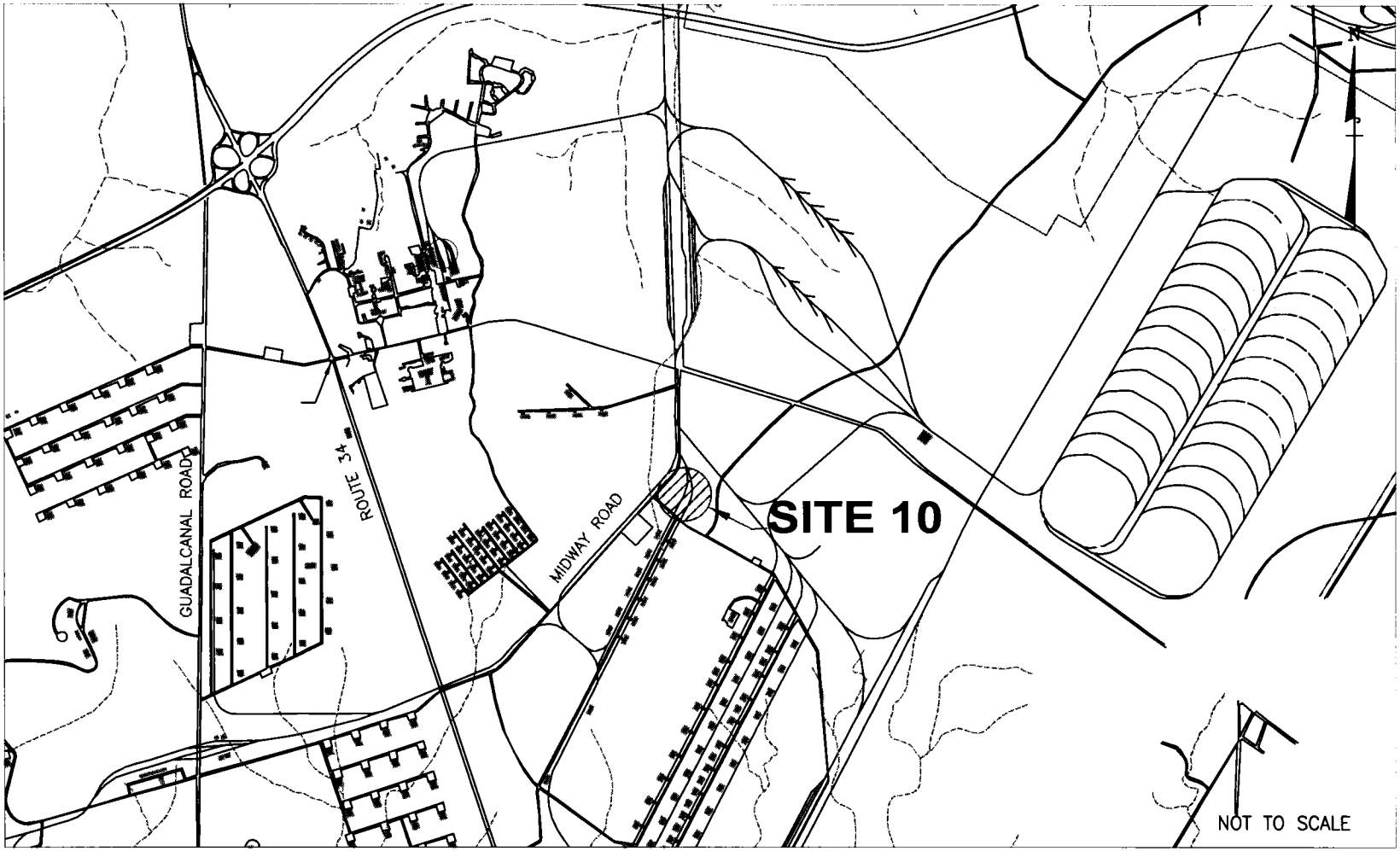


NOT TO SCALE

SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 3

FIGURE 1
SITE LOCATION MAP
NAVAL WEAPONS STATION EARLE

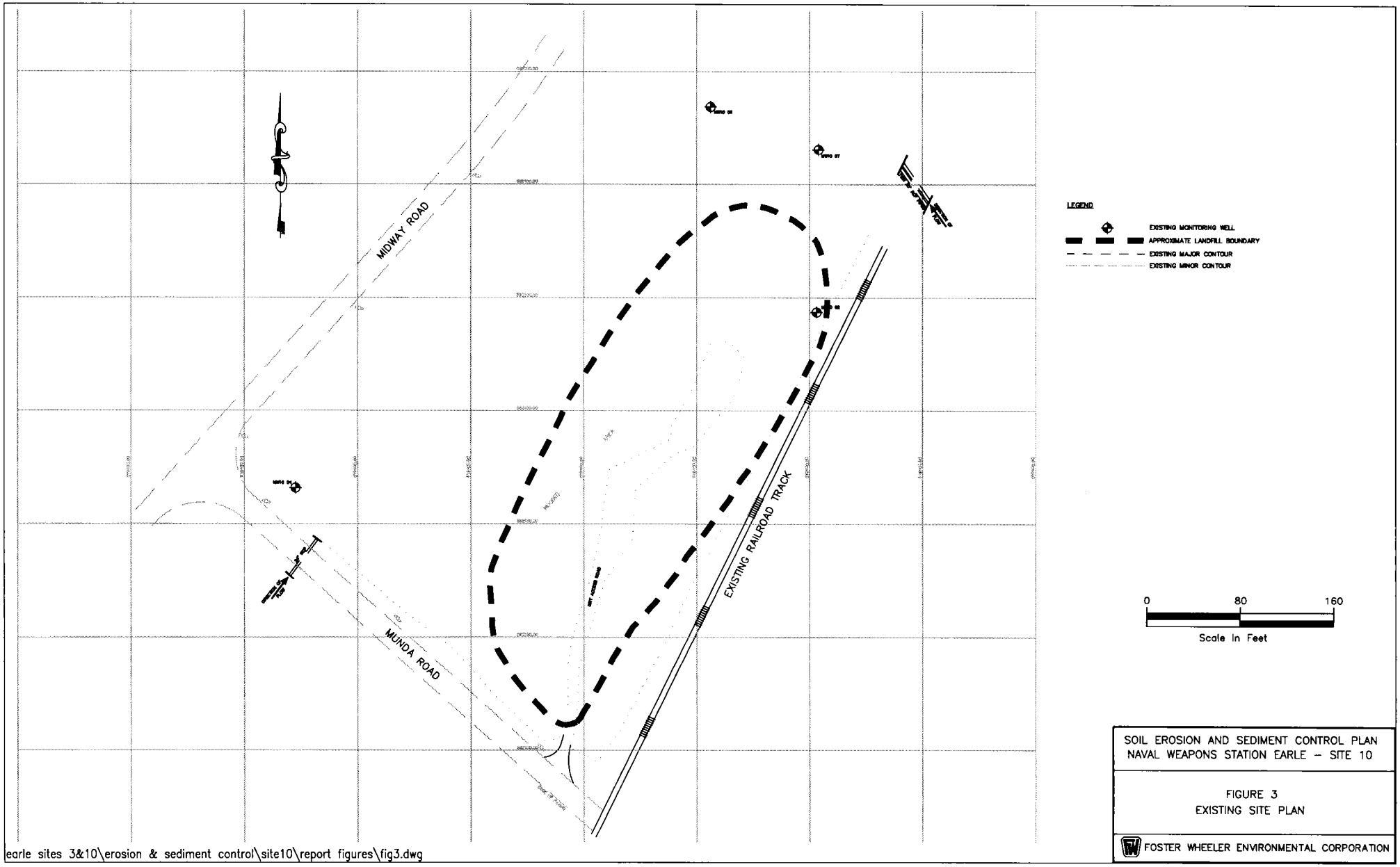
FOSTER WHEELER ENVIRONMENTAL CORPORATION



SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10

FIGURE 2
SITE LOCATION MAP – SITE 10

FOSTER WHEELER ENVIRONMENTAL CORPORATION



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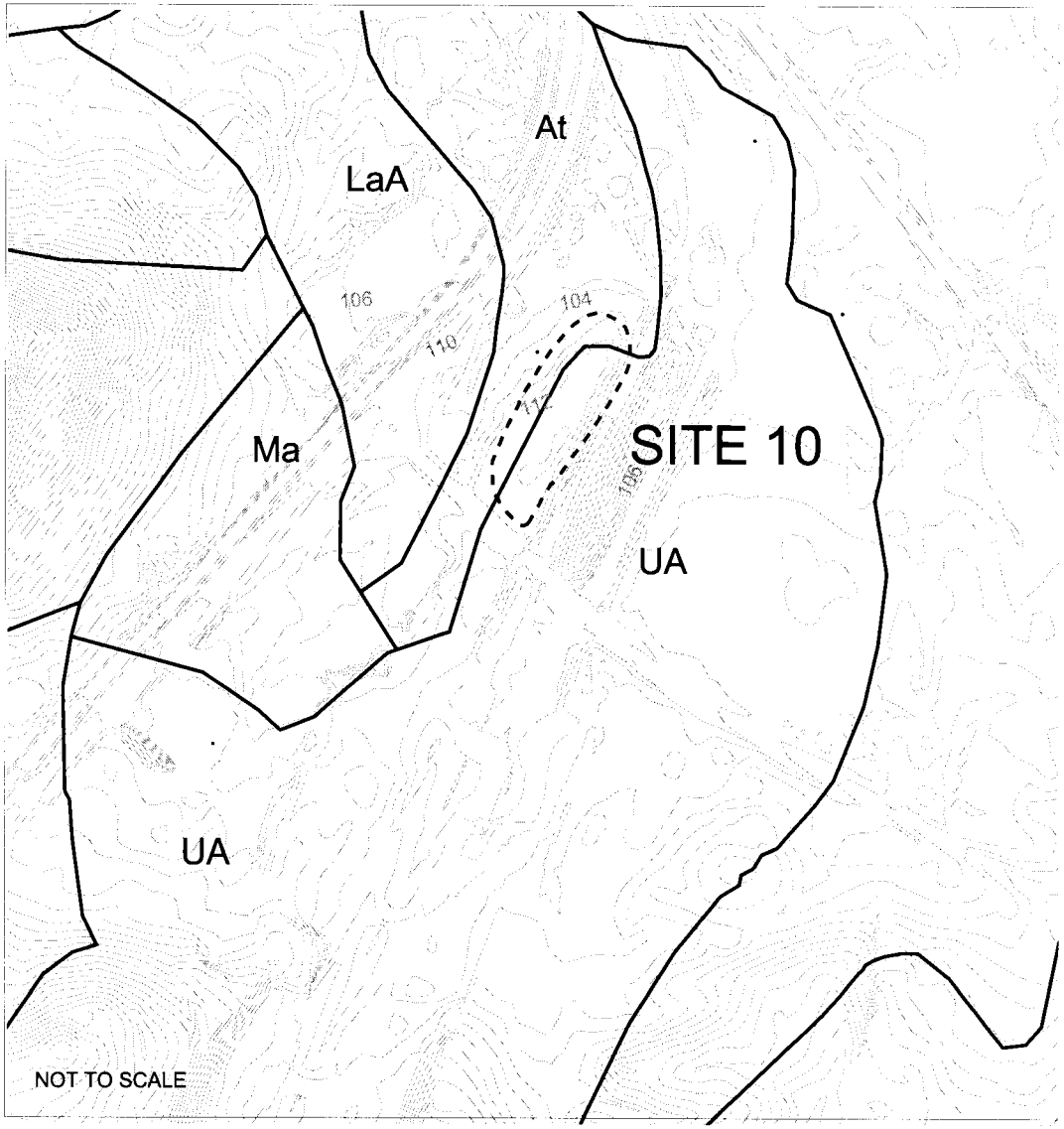
SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10

FIGURE 3
EXISTING SITE PLAN

FOSTER WHEELER ENVIRONMENTAL CORPORATION



Legend
At - Atsion sand. Nearly level, poorly drained soil in depressional areas and on broad flats. Permeability of the Atsion soil is moderately rapid or rapid in the subsoil and rapid in the substratum.

Ma - Manahawkin Muck. Nearly level and very poorly drained soil in wide depressional areas and on broad flats. Permeability is moderately slow to moderately rapid in the subsoil and moderately rapid in the substratum.

LaA- Lakehurst sand, 0 to 2 percent slopes.
This is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides.
Permeability of this Lakehurst soil is rapid in the subsoil and the substratum.

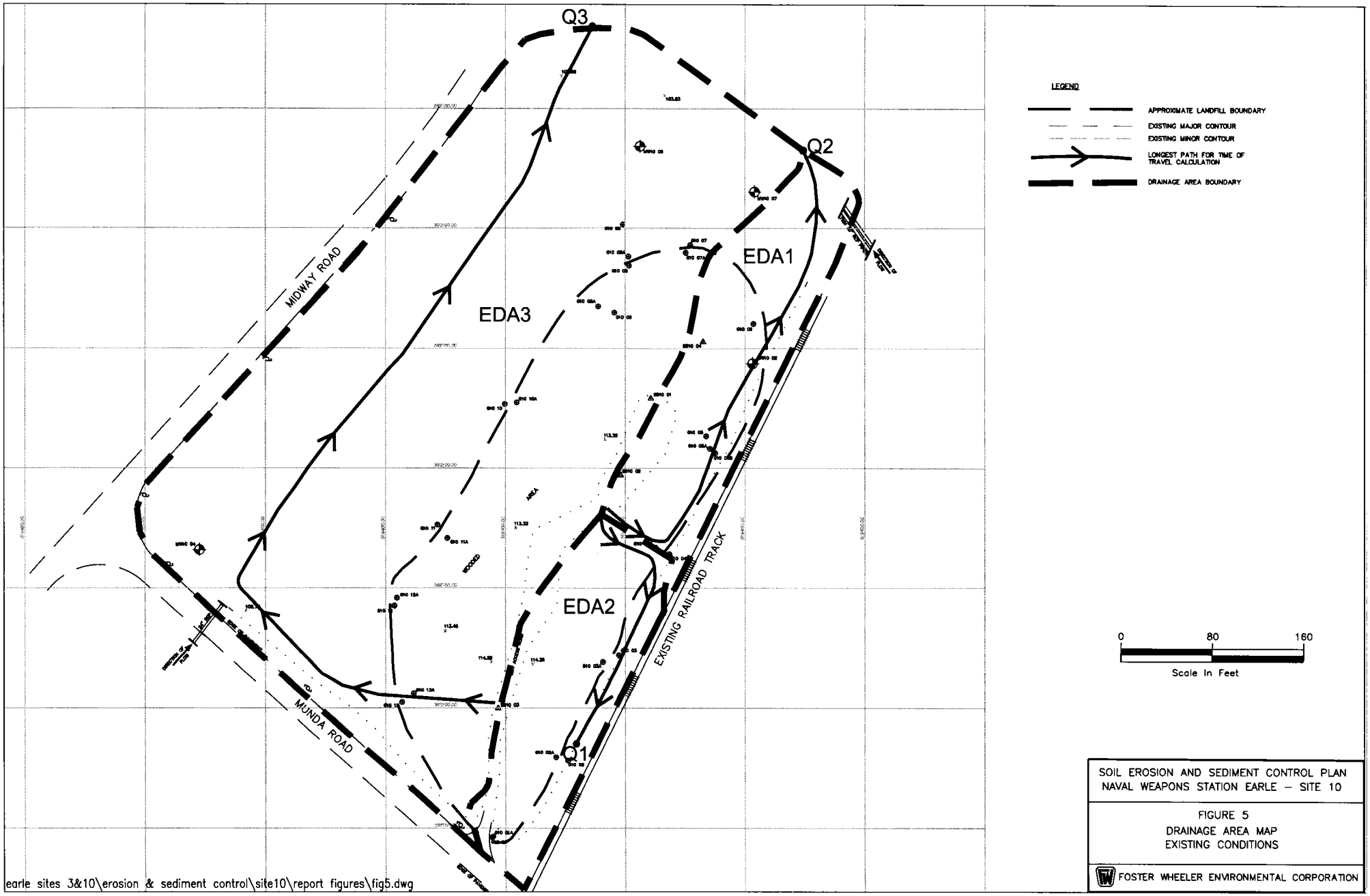
UA - Udorthents, smooth.
This soil unit consists of areas of soil that have been altered by excavating or filling. The properties of this soil differ from place to place. Onsite investigation and evaluation are needed for most uses.

Source: USDA, Soil Conservation Service,
"Soil Survey of Monmouth County, New Jersey".

SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE - SITE 10

FIGURE 4
SOILS MAP

FOSTER WHEELER ENVIRONMENTAL CORPORATION



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SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10

FIGURE 5
DRAINAGE AREA MAP
EXISTING CONDITIONS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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SOIL EROSION AND SEDIMENT CONTROL PLAN
NAVAL WEAPONS STATION EARLE – SITE 10

FIGURE 6
DRAINAGE AREA MAP
PROPOSED CONDITIONS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

APPENDIX B

STORMWATER CALCULATIONS

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy – Earle	DMM	7/24/01
Location	**Checked**	**Date**
Site 10 – Q_1 (area EDA1)	KJB	8/1/01

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Atsion Sand (c)	WOODS-GRASS COMBINATION FAIR HYDROLOGIC CONDITION	76			0.66	50.16
	(EDA1 Area = 28,914 ft²)					

1/ Use only one CN source per line

Totals ➡ 0.66 | 50.16

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{50.16}{0.66} = 76$; Use CN ➡ 76

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6
Runoff, Q	in	1.36	2.74	3.38

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

(Calcs on Back)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{76} - 10 = 3.16$$

2 yr storm

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{[3.5 - (0.2)(3.16)]^2}{3.5 + (0.8)(3.16)} = \frac{8.23}{6.03} = 1.36$$

10 yr storm

$$Q = \frac{[5.25 - (0.2)(3.16)]^2}{5.25 + (0.8)(3.16)} = \frac{21.33}{7.78} = 2.74$$

25 yr storm

$$Q = \frac{[6 - (0.2)(3.16)]^2}{6 + (0.8)(3.16)} = \frac{28.82}{8.53} = 3.38$$

EDA-1

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY-FARLE	KJB	8/24/01
Location	**Checked**	**Date**
SITE 10 - OU (EDA-1)	DMM	8/25/01

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB		
1. Surface description (table 3-1)	WOODS/UNDERBRUSH		
2. Manning's roughness coefficient, n (table 3-1)	0.40		
3. Flow length, L (total L † 300 ft) ft	299		
4. Two-year 24-hour rainfall, P_2 in	3.5		
5. Land slope, s ft/ft	0.02		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.70	+	= 0.70

Segment ID	BC		
7. Surface description (paved or unpaved)	UNPAVED		
8. Flow length, L ft	130		
9. Watercourse slope, s ft/ft	0.05		
10. Average velocity, V (figure 3-1) ft/s	1.9		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.02	+	= 0.02

Channel flow

Segment ID			
12. Cross sectional flow area, a ft^2			
13. Wetted perimeter, p_w ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft			
15 Channel slope, s ft/ft			
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s			
18. Flow length, L ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+	= -

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 0.72

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAVY-EAGLE	KJB	8/24/01
Location	**Checked**	**Date**
SITE 10-Q (EDA-1)	DMM	8/25/01

Check one: ☒ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.0001 mi^2 (acres/640)

Runoff curve number ..... CN = 76 (From worksheet 2)

Time of concentration ..... T_c = 0.72 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (_____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	0.632	0.632	0.632
5. Compute I_a / P		0.18	0.12	0.11
6. Unit peak discharge, q_u (Use T_c and I_a / P with exhibit 4– III)	csm/in	330	345	360
7. Runoff, Q (From worksheet 2) Figure 2-6	in	1.36	2.74	3.38
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	0.45	0.95	1.22
(Where $q_p = q_u A_m Q F_p$) ADD FLOW FROM TWIN 30" RCP		25.16	25.16	25.16
TOTAL		25.61	27.11	27.38

EOA-2 1/1

Worksheet 2: Runoff curve number and runoff

Project	By	Date
NAVY EBBLS	KJB	8/1/01
Location	**Checked**	**Date**
SITE 10 - Q2 (AREA EOA2)	DMM	8/2/01

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
ATSION SAND (C)	WOOD-GRASS COMBINATION FAIR HYDROLOGIC CONDITION (24927 SQ.FT)	76			0.57	43.32

1/ Use only one CN source per line

Totals ➡ 0.57 | 43.32

CN (weighted) = total product / total area = 43.32 / 0.57 = 76 ; Use CN ➡ 76

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6
Runoff, Q	in	1.36	2.74	3.38

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/1/01 SHEET 2 OF 4

CHKD. BY DMM DATE 8/2/01 OFS NO. DEPT. NO.

CLIENT NAVY - EARLE

PROJECT

SUBJECT SITE 6 → O_2 (AREA EDA 2)

- FIND Q (RUNOFF) - TR55 WKSHT 2

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

P = RAINFALL (24-HR) - IN
S = MAX. RETENTION
CN = CURVE NUMBER

$$S = \frac{1000}{CN} - 10$$

TWO YR STORM CN = 76, P = 3.5 IN

$$S = \frac{1000}{76} - 10 = 3.16 \quad \therefore \quad Q = \frac{(3.5 - 0.2(3.16))^2}{3.5 + 0.8(3.16)} = 1.36 \text{ IN}$$

TEN YR STORM CN = 76, P = 5.25 IN

$$S = \frac{1000}{76} - 10 = 3.16 \qquad Q = \frac{(5.25 - 0.2(3.16))^2}{5.25 + 0.8(3.16)} = 2.74 \text{ IN}$$

TWENTY-FIVE YR STORM CN = 76, P = 3.5 IN

$$S = \frac{1000}{76} - 10 = 3.16 \qquad Q = \frac{(6 - 0.2(3.16))^2}{6 + 0.8(3.16)} = 3.38 \text{ IN}$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - EDA-2	KJB	8/24/01
Location	**Checked**	**Date**
SITE 10 - Q_2 (EDA-2)	DMM	8/25/01

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB	BC	CD
1. Surface description (table 3-1)	WOODS, LIGHT UNDERBRUSH		
2. Manning's roughness coefficient, n (table 3-1)	← 0.40 →		
3. Flow length, L (total L † 300 ft) ft	47	20	115
4. Two-year 24-hour rainfall, P_2 in	← 3.5 →		
5 Land slope, s ft/ft	0.038	0.15	0.009
6 $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T_t hr	0.15	+ 0.04	+ 0.53 = 0.72

Segment ID			
7. Surface description (paved or unpaved)			
8. Flow length, L ft			
9. Watercourse slope, s ft/ft			
10. Average velocity, V (figure 3-1) ft/s			
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		+	=

Channel flow

Segment ID			
12. Cross sectional flow area, a ft^2			
13. Wetted perimeter, p_w ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft			
15 Channel slope, s ft/ft			
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\, r^{2/3} s^{1/2}}{n}$ Compute V ft/s			
18. Flow length, L ft			
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 0.72

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAVY-EAGLE	KJB	8/24/01
Location	**Checked**	**Date**
SITE 10 - OU2 (EDA-2)	DMM	8/25/01

Check one: ☒ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.0009 mi^2 (acres/640)

Runoff curve number ..... CN = 76 (From worksheet 2)

Time of concentration ..... T_c = 0.72 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	2	10	25
3. Rainfall, P (24-hour) ..... in	3.5	5.25	6.0
4. Initial abstraction, I_a ..... in (Use CN with table 4-1)	0.632	0.632	0.632
5. Compute I_a / P	0.18	0.12	0.11
6. Unit peak discharge, q_u ..... csm/in (Use T_c and I_a / P with exhibit 4– III)	330	345	360
7. Runoff, Q ..... in (From worksheet 2) Figure 2-6	1.36	2.74	3.38
8. Pond and swamp adjustment factor, F_p ..... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)	1.0	1.0	1.0
9. Peak discharge, q_p ..... ft^3/s	0.40	0.85	1.10

(Where $q_p = q_u A_m Q F_p$)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Navy - Earle	DMM	7/25/01
Location	**Checked**	**Date**
Site 10 - Q_3 (area EDA3)	KTB	7/26/01

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious: unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi^2 ☐ %	Product of CN x area
Lakehurst Sand (B)	Woods - Grass Combination (Area = 33,312 ft^2)	65			0.76	49.4
Atsion Sand (C)	Woods - Grass Combination (Area = 140,638 ft^2)	76			3.22	244.72
[1] Use only one CN source per line				Totals ➡	3.98	294.12

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{294.12}{3.98} = 73.9$; Use CN ➡ **74**

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	1.24	2.57	3.19

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

(Calcs. on Back)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{74} - 10 = 3.51$$

2 yr storm

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{[3.5 - (0.2)(3.51)]^2}{3.5 + 0.8(3.51)} = \frac{7.83}{6.31} = 1.24$$

10 yr storm

$$Q = \frac{[5.25 - (0.2)(3.51)]^2}{5.25 + 0.8(3.51)} = \frac{20.68}{8.06} = 2.57$$

25 yr storm

$$Q = \frac{[6 - (0.2)(3.51)]^2}{6 + 0.8(3.51)} = \frac{28.07}{8.81} = 3.19$$

EDA-3 2/=

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - EDDIE	KJB	8/24/01
Location	**Checked**	**Date**
SITE 10-03 (EDA-3)	DMM	8/25/01

Check one: ☐ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB	BC	CD	
1. Surface description (table 3-1)	WOODS	UNIMPROVED		
2. Manning's roughness coefficient, n (table 3-1)	← 0.4 →			
3. Flow length, L (total L ≤ 300 ft) ft	105	45	105	
4. Two-year 24-hour rainfall, P_2 in	← 3.5 →			
5 Land slope, s ft/ft	0.009	0.089	0.010	
6 $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t hr	0.49	0.01	+ 0.47	= 0.95

Segment ID	EF		
7 Surface description (paved or unpaved)	UNPAVED		
8. Flow length, L ft	365		
9. Watercourse slope, s ft/ft	0.005		
10. Average velocity, V (figure 3-1) ft/s	1.1		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.14	+	= 0.14

Channel flow

Segment ID		
12. Cross sectional flow area, a ft^2		
13. Wetted perimeter, p_w ft		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft		
15 Channel slope, s ft/ft		
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V ft/s		
18. Flow length, L ft		
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+	= -
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		1.09

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Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NBW-EDA-3	K.B	8/24/01
Location	**Checked**	**Date**
SITE 10 - Q_3 (EDA-3)	DMM	8/25/01

Check one: ☐ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.006 mi^2 (acres/640)

Runoff curve number ..... CN = 74 (From worksheet 2)

Time of concentration ..... T_c = 1.05 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	25
3. Rainfall, P (24-hour)	in	3.5	5.25	6.0
4. Initial abstraction, I_a (Use CN with table 4-1)	in	0.703	0.703	0.703
5. Compute I_a / P		0.20	0.13	0.12
6. Unit peak discharge, q_u (Use T_c and I_a / P with exhibit 4– I)	csm/in	280	290	295
7. Runoff, Q (From worksheet 2) Figure 2-6	in	1.24	2.57	3.19
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0	1.0	1.0
9. Peak discharge, q_p	ft^3/s	2.08	4.47	5.65
(Where $q_p = q_u A_m Q F_p$) ADD FULL FLOW FROM 24" RCP		10.14	10.14	10.14
TOTAL		12.22	14.61	15.79

Worksheet 2: Runoff curve number and runoff

Project	By	Date
NAVY - ERIE	KJB	8/20/01
Location	**Checked**	**Date**
SITE 10 - Q, (PDA-1)	DMM	8/21/01

Check one: ☐ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
TOP SOIL (B)	TOP OF LANDFILL, GRASS - AREA = 30,022.50 FT.	61			0.69	42.09
LANDFILL COVER (B)	RIP-RAP TOE-OF SLOPE - AREA = 5201.50 FT	85			0.12	10.20
ATSION SAND (C)	CLEARED AND GRUBBED, RE-VEGETATED (4,548 FT²)	74			0.10	7.40
ATSION SAND (C)	WOOD-GRASS COMBINATION (AREA = 9,441.50 FT)	76			0.22	16.72
				Totals ➡	1.13	76.41

[1] Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{76.41}{1.13} = 67.62$; Use CN ➡ **68**

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	0.90	2.06	2.62

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

(CALCS ON BACK)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{88} - 10 = 4.71$$

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

FOR TWO (2) YEAR STORM - P = 3.5"

$$Q = \frac{(3.5 - 0.2(4.71))^2}{3.5 + 0.8(4.71)} = 0.90 \text{ in}$$

FOR TEN (10) YEAR STORM: P = 5.25 in.

$$Q = \frac{(5.25 - 0.2(4.71))^2}{5.25 + 0.8(4.71)} = 2.06 \text{ in}$$

FOR TWENTY-FIVE YEAR STORM: P = 6.0 in

$$Q = \frac{(6.0 - 0.2(4.71))^2}{6.0 + 0.8(4.71)} = 2.62 \text{ in}$$

PDA-1 2,

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY - EAGLE	KJB	8/20/01
Location	**Checked**	**Date**
SITE 10 - Q1 (PDA-1)	DMM	8/21/01

Check one: ☐ Present ☐ Developed

Check one: ☐ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB	BC	CD	EF	FG
1. Surface description (table 3-1)	DENSE GRASS	RIP RAP 5"	DENSE GRASS	RIP RAP 3"	WOODS / UNDERBRUSH
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.035	0.25	0.032	0.40
3. Flow length, L (total L † 300 ft) ft	100	8	15	15	100
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	3.5	3.5	3.5
5. Land slope, s ft/ft	0.06	0.625	0.5	0.006	0.006
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T_t hr	0.15	0.032 +		0.016	+ 0.55 = 0.72
		0.014			TOTAL

Segment ID		
7. Surface description (paved or unpaved)		
8. Flow length, L ft		
9. Watercourse slope, s ft/ft		
10. Average velocity, V (figure 3-1) ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	+	=

Channel flow

Segment ID	DE	
12. Cross sectional flow area, a ft^2	6.0	
13. Wetted perimeter, p_w ft	6.72	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	0.89	
15 Channel slope, s ft/ft	0.005	
16. Manning's roughness coefficient, n	0.25	
17. $V = \frac{1.49\ r^{2/3} s^{1/2}}{n}$ Compute V ft/s	0.43	
18. Flow length, L ft	515	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.33 +	= 0.33
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		1.06

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAVY-EARLE	KJB	8/20/01
Location	**Checked**	**Date**
SITE D-Q, (PDA-1)	DMM	8/21/01

Check one: ☐ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.002 mi^2 (acres/640)

Runoff curve number ..... CN = 68 (From worksheet 2)

Time of concentration ..... T_c = 1.06 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	2	10	25
3. Rainfall, P (24-hour) ..... in	3.5	5.25	6.0
4. Initial abstraction, I_a ..... in (Use CN with table 4-1)	0.941	0.941	0.941
5. Compute I_a / P	0.27	0.18	0.16
6. Unit peak discharge, q_u ..... csm/in (Use T_c and I_a / P with exhibit 4–III)	260	280	290
7. Runoff, Q ..... in (From worksheet 2) Figure 2-6	0.90	2.06	2.62
8. Pond and swamp adjustment factor, F_p ..... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)	1.0	1.0	1.0
9. Peak discharge, q_p ..... ft^3/s	0.47	1.15	1.52
(Where $q_p = q_u A_m Q F_p$) Q FROM TWIN 36" RCP	26.16	26.16	26.16
TOTAL	26.63	27.31	27.68

Worksheet 2: Runoff curve number and runoff

Project	By	Date
NAVY-EARLE	KTB	8/21/01
Location	**Checked**	**Date**
SITE 10 - O2 (PDA-2)	DMM	8/22/01

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
TOP SOIL (B)	TOP OF LANDFILL, GRASS (AREA = 34,960 FT²)	61			0.80	48.80
LANDFILL COVER (B)	TOE OF SLOPE, 6" RIP RAP (AREA = 8,396 FT²)	85			0.19	16.15
ATSION SAND (C)	CLEARED + GRUBBED, RE-VEG. (AREA = 19,544.50 FT²)	74			0.45	33.30
ATSION SAND (C)	WOOD-GRASS COMBINATION (AREA = 73,884 FT²)	76			1.70	129.20
LAKEHURST SAND (B)	WOODS-GRASS COMBINATION (AREA = 33,312 FT²)	65			0.76	49.40

1/ Use only one CN source per line

Totals ➡ 3.90 | 276.85

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{276.85}{3.90} = 70.99$; Use CN ➡ 71

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3.5	5.25	6.0
Runoff, Q	in	1.07	2.31	2.90

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

(CALCS ON BACK)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{71} - 10 = 4.08$$

$$Q = \frac{(P - 0.2(S))^2}{P + 0.8(S)}$$

FOR TWO (2) YEAR STORM: $P = 3.5$ IN

$$Q = \frac{(3.5 - 0.2(4.08))^2}{3.5 + 0.8(4.08)} = 1.07 \text{ IN}$$

FOR TEN (10) YEAR STORM: $P = 5.25$ IN

$$Q = \frac{(5.25 - 0.2(4.08))^2}{5.25 + 0.8(4.08)} = 2.31 \text{ IN}$$

FOR TWENTY-FIVE (25) YEAR STORM: $P = 6.0$ IN

$$Q = \frac{(6.0 - 0.2(4.08))^2}{6.0 + 0.8(4.08)} = 2.90$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
NAVY-FABRE	KJB	8/21/01
Location	**Checked**	**Date**
SUB 10 - Q2 (PDA-2)	DMM	8/22/01

Check one: ☐ Present ☒ Developed

Check one: ☐ T_c ☒ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	AB	BC	CD	DE	EF
1. Surface description (table 3-1)	DENSE GRASS	RIPRAP 6"	DENSE GRASS	MEDIUM GRASS	WOODS/UNDERBRUSH
2. Manning's roughness coefficient, n (table 3-1)	0.25	0.035	0.25	0.25	0.4
3. Flow length, L (total L † 300 ft) ft	70	12	20	50	135
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	3.5	3.5	3.5
5. Land slope, s ft/ft	0.06	0.33	0.05	0.08	0.07
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T_t hr	0.11	0.003	+0.04	0.08	0.56 = 0.59

Segment ID	FG	
7. Surface description (paved or unpaved)	UNPAVED	
8. Flow length, L ft	565	
9. Watercourse slope, s ft/ft	0.005	
10. Average velocity, V (figure 3-1) ft/s	1.1	
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.14 +	= 0.14

Channel flow

Segment ID		
12. Cross sectional flow area, a ft^2		
13. Wetted perimeter, p_w ft		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft		
15 Channel slope, s ft/ft		
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49\ r^{2/3} s^{1/2}}{n}$ Compute V ft/s		
18. Flow length, L ft		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 1.03

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
NAVY-EARLE	KJB	8/21/01
Location	**Checked**	**Date**
SITE 10 - Q2 (PDA-2)	DMM	8/22/01

Check one: ☐ Present ☐ Developed

1. Data

Drainage area ..... A_m = 0.006 mi² (acres/640)

Runoff curve number ..... CN = 71 (From worksheet 2)

Time of concentration ..... T_c = 1.03 hr (From worksheet 3)

Rainfall distribution ..... = III (I, IA, II III)

Pond and swamp areas sprea throughout watershed ..... = — percent of A_m (_____ acres or mi² covered)

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	2	10	25
3. Rainfall, P (24-hour) ..... in	3.5	5.25	6.0
4. Initial abstraction, I_a ..... in (Use CN with table 4-1)	0.817	0.817	0.817
5. Compute I_a/P	0.23	0.16	0.14
6. Unit peak discharge, q_u ..... csm/in (Use T_c and I_a/P with exhibit 4– III)	280	295	305
7. Runoff, Q ..... in (From worksheet 2) Figure 2-6	1.07	2.31	2.90
8. Pond and swamp adjustment factor, F_p ..... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)	1.0	1.0	1.0
9. Peak discharge, q_p ..... ft³/s	1.79	4.09	5.30
(Where $q_p = q_u A_m Q F_p$) + Q FROM FULL 24" RCP	10.14	10.14	10.14
TOTAL	11.93	14.23	15.44

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 7/23/01 SHEET 1 OF 2

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CLIENT NAVY - ERIE

PROJECT SITE 10

SUBJECT EXISTING FLOWS (PIPES)

- TWIN 30" RCP PIPES FLOWING FULL (NORTHEAST CORNER)

Q = FLOW (CFS)

A = AREA (FT^2) → CIRCULAR PIPE = $\frac{\pi D^2}{4}$ D = DIAMETER (FT)

$A = \pi D^2/4 = \pi (30/12)^2/4 = 4.91\ FT^2$

WP = WETTED PERIMETER (FT)

- FOR CIRCULAR PIPE FLOWING FULL = $2\pi r$ r = RADIUS

$WP = 2\pi r = 2(\pi)(30/12/2) = 7.85$ FT

R = HYDRAULIC RADIUS = A/WP

$R = A/WP = 4.91/7.85 = 0.63$ FT

S = SLOPE OF PIPES

- FROM SITE PLAN

NORTH PIPE $\frac{102.61 - 102.56}{40} = 0.001\ FT/FT \left(\frac{RISE}{RUN}\right)$

- PIPE FLOWS SE → NW

SOUTH PIPE $\frac{102.60 - 102.56}{40} = 0.001$

- PIPE FLOWS SE → NW

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 7/23/01 SHEET 2 OF 2

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CLIENT NAVY - EARLE

PROJECT SITE 10

SUBJECT EXISTING FLOWS (PRES)

USE MANNINGS EQ TO FIND Q

$Q = 1.49/n \, AR^{2/3} S^{1/2}$ n = MANNINGS COEFFICIENT - FOR RCP, n = 0.013

∴ AS ALL INFO FOR BOTH ARE SAME, Q IN EACH PIPE

$Q = 1.49/0.013 \, (4.91), (0.63^{2/3})(0.001)^{1/2}$

Q = 13.08 CFS IN EACH PIPE

24" RCP FLOWING FULL (SOUTHWEST CNR)
- PIPES FLOWS S → N

$A = \pi D^2/4 = \pi(24/12)^2/4 = 3.14 \text{ FT}^2$

$WP = 2\pi r = 2(\pi)(24/12/2) = 6.28 \text{ FT}$

$R = A/WP = 3.14/6.28 = 0.50 \text{ FT}$

$S = \text{RISE/RUN} = \frac{107.41 - 107.35}{40} = 0.002 \text{ FT/FT}$ (FROM SITE PLAN)

∴ $Q = 1.49/n \, AR^{2/3} S^{1/2}$

$Q = 1.49/0.013 \, (3.14)(0.50^{2/3})(0.002^{1/2})$

Q = 10.14 CFS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 8/17/01 SHEET 1 OF
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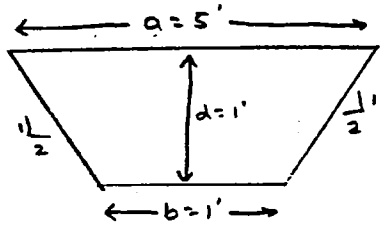
CLIENT Navy
PROJECT Earle
SUBJECT Site 10 - Proposed Swale Calculations

Assume dimensions of swale as follows:



b = 1'
d = 1'
a = 5'

n = Manning's Roughness Coefficient = 0.25 (grass lined)
→ from Standards for Soil Erosion Control Manual (NJ)

- Find Area (A) of the swale
  = $\frac{1}{2}(d)(a+b)$
  = $\frac{1}{2}(1)[1+(1+(2)(2)(1)]$
  = 3 ft²

- Find WP (Wetted Perimeter) for full swale
  = (2)(2.24)(1) + 1
  = 5.48 ft

- Find R for full swale
  = $\frac{A}{P} = \frac{3.0}{5.48}$
  = 0.55 ft.

$S = \frac{108-105}{515}$
= 0.006

- Find Q for full swale

$Q_{swale} = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$= \frac{1.49}{0.25}(3)(0.55)^{2/3}(0.006)^{1/2}$

= 0.930 ft³/s

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY DMM DATE 8/17/01 SHEET 1 OF 1

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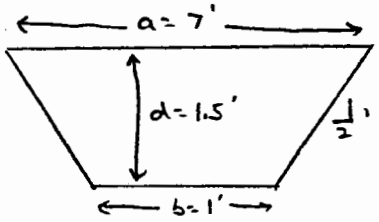
CLIENT Navy

PROJECT Earle

SUBJECT Site 10 - Proposed Swale Calculations

Assume dimensions of swale as follows:



b = 1'
d = 1.5'
a = 7'

n = Manning's Roughness coefficient = 0.25 (grass lined)
→ from Standards for Soil Erosion Control Manual

- Find Area (A) of the swale
  = 1/2 (d)(a + b)
  = 1/2 (1.5)[1 + (1 + (2)(2)(1.5))]
  = 6 ft²

- Find WP (Wetted Perimeter) for full swale
  = (2)(2.24)(1.5)
  = 6.72 ft.

- Find R for full swale
  = A/P = 6 ft² / 6.72 ft
  = 0.89 ft

S = (108.25 - 105) / 515
= 0.006

- Find Q for full swale

$$Q_{swale} = \frac{1.49}{n} A R^{2/3} S^{1/2}$$
$$= \frac{1.49}{0.25} (6)(0.89)^{2/3} (0.006)^{1/2}$$
$$= 2.56 \text{ ft}^3/\text{s}$$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/21/01 SHEET 1 OF 1

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CLIENT NAVY - EFDLE

PROJECT SITE 10

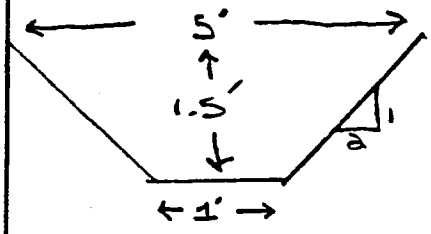
SUBJECT SWALE ADEQUACY & STABILITY CHECK

ADEQUACY CHECK

- FROM TR-55 CALCULATIONS: MAX Q_{25} IN SWALE = $1.52\ FT^3/S$ (Q_1 → PDA-1)

- FROM SITE 10 - PROPOSED SWALE CALCULATIONS

- FOR A FULL SWALE WITH FOLLOWING DIMENSIONS:



$Q_{FULL} = 2.56\ FT^3/S$

$\therefore\ Q_{FULL} >> Q_{25}$

SLOPE = $0.005\ FT/FT$

- DESIGN IS ADEQUATE

STABILITY CHECK

- MAX Q_{25} IN SWALE = $2.56\ FT^3/S$ (Q_1 FROM PDA-1)

- FROM NJ SESC STANDARD (JULY 1999)
  - STABILITY CALCS ARE NOT REQUIRED IF VELOCITY (V) < $1.8\ FT/S$

$Q = VA \quad \therefore \quad V = Q/A$

$$V = \frac{2.56\ FT^3/S}{6.0\ FT^2} = 0.43\ FT/S$$

$0.44\ FT/S < 1.8\ FT/S$

THEREFORE, NO STABILIZATION OF THE GRASS LINED SWALE IS REQUIRED

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY KJB DATE 8/21/01 SHEET 1 OF 1

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CLIENT NAVY - EARLE

PROJECT SITE 10

SUBJECT CONDUIT OUTLET PROTECTION

- MAX Q_{FULL} FOR SWALE = $2.56\ ^{FT^3}/_S$ (TR-55 CALCS FOR Q_1 (PDA-1)

- USING STANDARD 12-1 OF THE NJSESC STANDARDS

- LENGTH OF APRON (L_a) =

$= 1.8\ ^{q}/_{D_0^{\frac{1}{2}}} + 7D_0$

$= 1.8\left(\frac{0.51}{1.5^{\frac{1}{2}}}\right) + 7(1)$

$D_0 = 1.5'$

$W_0 = 5'$

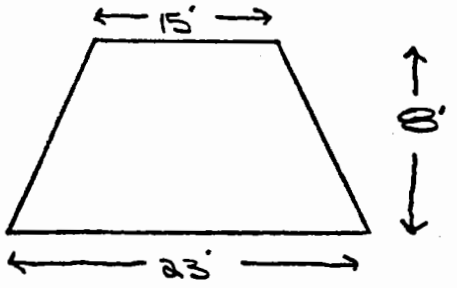
$q = Q_{25}/W_0 = 2.56/5 = 0.51$

$L_a = 7.75' = 8'$

- WIDTH 1 OF APRON = $3W_0 = 3(5) = 15'$

- WIDTH 2 OF APRON = $3W_0 + L_a$
= $3(5) + 8$
= 23 FT

∴ APRON SECTION



- MEDIAN STONE DIAMETER (d_{50}) = $\frac{0.016}{0.2D_0}\ q^{1.33} = \frac{0.016}{0.2(1)}\ (0.51^{1.33})$

$D_{50} = 0.32' = 3.84''$ ∴ USE $D_{50} = 4''$

- THICKNESS OF APRON = $2D_{50}$ (WITH USE OF FILTER FABRIC)
= $2(4) = 8''$