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)

RW 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

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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 - Q1 (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, RELVEG. (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)

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

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

- 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 · EARLE	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 T_c only)

Segment ID	AB	BC	CD	EF	
1. Surface description (table 3-1)	DENSE GRASS	RIP RAP 6"	DENSE GRASS	RIP RAP 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 +	0.014	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

Worksheet 4: Graphical Peak Discharge method

Project	By	Date
Navy-Eagle	KJB	10/5/01
Location	**Checked**	**Date**
Site 10 - Q, (PDA-1)	DMM	10/6/01

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 = 0.264 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	0.941	0.941	0.941
5. Compute I_a/P		0.27	0.18	0.16
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4– III)	csm/in	470	490	500
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.9	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	0.85	2.02	2.62
(Where $q_p = q_u A_m Q F_p$) Q FROM TWIN 30" RCP		26.16	26.16	26.16
TOTAL		27.01	28.18	28.78

FOSTER WHEELER ENVIRONMENTAL CORPORATION

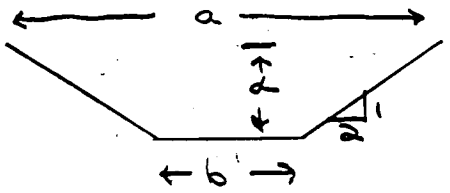
BY KJB DATE 10/5/01 SHEET 1 OF 2

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

CLIENT NAVY - EARLE

PROJECT SITE 10

SUBJECT ADEQUACY OF PROPOSED SWALE



PROPOSED $b = 1'$
$d = 1'$

I. FIND TOP WIDTH "a"

$a = 2 + 2 + 1 = 5'$

II FIND AREA OF SWALE "A"

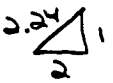
$A = \frac{1}{2} d (a + b)$
$A = \frac{1}{2} (1)(2 + 1 + 2 + 1)$
$A = 3 \text{ FT}^2$

III USE MANNING'S EQ. TO FIND Q_{FULL} FOR SWALE

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

- $n = 0.032$ FOR A RIP-RAP LINED SWALE (SEE MANUAL)

- WP = WETTED PERIMETER
  = $2.24(2) + 1$
  = 5.48 FT



- R = HYDRAULIC RADIUS
  = A/WP
  = 3/5.48 = 0.55 FT

- S = SLOPE = 0.006 FT/FT → DESIGN

$\therefore Q = \frac{1.49}{0.032}(3)(0.55^{2/3})(0.006^{1/2})$

$Q_{FULL} = 7.26 \text{ FT}^3/\text{S}$

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

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

CLIENT NAVY-EARLE

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

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

$7.26 >> 2.62$

$\therefore$ 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.

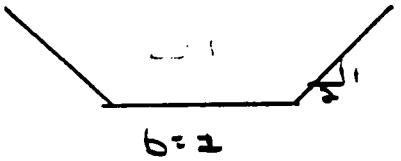
CLIENT NAVY - EARLE

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

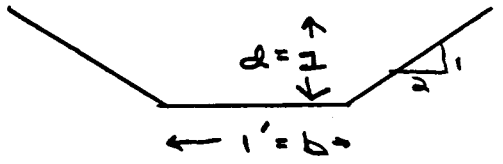
BY KJB DATE 10/5/01 SHEET 1 OF 1

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 $d_{50} = 12(118\, Q\, S^{13/6}\, R/P)^{2/3}$

$= 12(118\,(2.62)(0.006^{13/6})(1/9.5))^{2/3}$

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

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

$n = 0.0315$

∴ DESIGN ≈ ACTUAL

$0.032 \approx 0.0315$

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

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

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

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

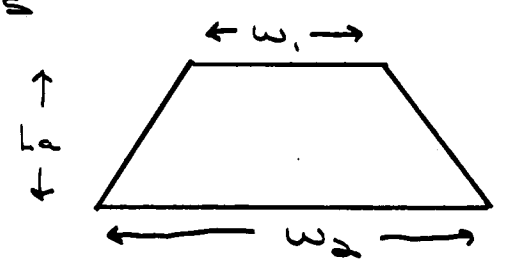
CLIENT NAVY - EARLE

PROJECT SITE 10 -

SUBJECT CONDUIT OUTLET PROTECTION

- USING STANDARD 12 OF THE NJSESC STANDARDS

- Q_{25} (TR-55) NO SWALE = 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'

$W_b = 5'$

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

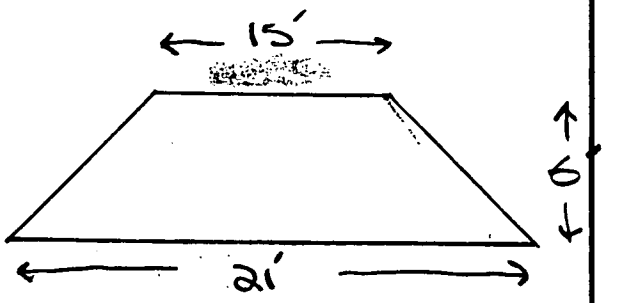
$\therefore \; L_a = 1.8\left(\frac{0.53}{0.632^{1/2}}\right) + 7(0.632) = 5.62' = 6'$

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