

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE <b>J</b>	PAGE OF PAGES <b>1   2</b>
2. AMENDMENT/MODIFICATION NO. <b>0003</b>	3. EFFECTIVE DATE <b>14-Nov-2002</b>	4. REQUISITION/PURCHASE REQ. NO. <b>W26GLG-2038-3181</b>	5. PROJECT NO.(If applicable) <b>5022896</b>		
6. ISSUED BY CONTRACTING OFFICE (CA/CW) US ARMY ENGR DIST NORFOLK ATTN: CENAO-SS-C 803 FRONT STREET NORFOLK VA 23510-1096	CODE <b>DACA65</b>	7. ADMINISTERED BY (If other than item 6) <b>See Item 6</b>		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				<input checked="" type="checkbox"/>	9A. AMENDMENT OF SOLICITATION NO. <b>DACA65-02-B-0011</b>
				<input checked="" type="checkbox"/>	9B. DATED (SEE ITEM 11) <b>07-Oct-2002</b>
					10A. MOD. OF CONTRACT/ORDER NO.
					10B. DATED (SEE ITEM 13)
CODE	FACILITY CODE				
<b>11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS</b>					
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required)					
<b>13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.</b>					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) <b>AMENDMENT NO. 0003 TO DACA65-02-B-0011, HAZARDOUS WASTE TANKS, RADFORD ARMY AMMUNITION PLANT, RADFORD, VA.</b>					
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR  _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED  <b>14-Nov-2002</b>	

## SECTION SF 30 BLOCK 14 CONTINUATION PAGE

**The following items are applicable to this modification:**CONTINUATION

1. SECTION 00010: DELETE BIDDING SCHEDULE IN ITS ENTIRETY AND REPLACE WITH THE ATTACHED.
2. SECTION 00100: ADD CLAUSE FAR 52.217-5, Evaluation of Options, as attached.
3. SECTION 00800: ADD CLAUSE FAR 52.217-7, Option for Increased Quantity—Separately Priced Line Item.
4. Technical drawings and specifications are amended. Make appropriate changes in accordance with the attached.

Section 00010 - Solicitation Contract Form

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001	SCHEDULE I - BASE BID FFP Replacement of the existing Hazardous Waste Tanks with new tanks which meet RCRA and State standards, complete in accordance with the drawings and specifications, excluding items 0002 and 0003. PURCHASE REQUEST NUMBER: W26GLG-2038-3181	1	Lump Sum		

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NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002 OPTION	SCHEDULE II - OPTION ITEMS (0002-0003) FFP Price for all work associated with demolition of 3020 and 3054, complete in accordance with the drawings and specifications, excluding items 0001 and 0003.	1	Lump Sum		

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NET AMT

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003 OPTION		1	Lump Sum		

FFP

Price for all work associated with demolition of 3053, complete, in accordance with the drawings and specifications, excluding items 0001 and 0002.

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NET AMT

FOB: Destination

52.217-5 EVALUATION OF OPTIONS (JUL 1990)

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

(b) The Government may reject an offer as nonresponsive if it is materially unbalanced as to prices for the basic requirement and the option quantities. An offer is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(End of provision)

## 52.217-7 OPTION FOR INCREASED QUANTITY--SEPARATELY PRICED LINE ITEM (MAR 1989)

The Government may require the delivery of the numbered line item, identified in the Schedule as an option item, in the quantity and at the price stated in the Schedule. The Contracting Officer may exercise the option by written notice to the Contractor within 120 calendar days from receipt of Notice to Proceed. Delivery of added items shall continue at the same rate that like items are called for under the contract, unless the parties otherwise agree.

(End of clause)

THE PUMPS SERVICE CHARACTERISTICS ARE ATTACHED.

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 4
JOB ORDER NUMBER	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	
390803	46	5	N/A	

Objective:

Determine the TDH required at the maximum flow rate for the new C line Pump Tank pumps (3058-P1, 3058-P2 & 3058-P3)

Method:

Determine required total discharge head at the maximum flow rate in the new piping system using Darcy equations

Inputs:

Acid wastewater will be removed from the Pump Tank at the rate of 500 gpm.

Acid wastewater is less than 1% acid and can be treated as water at 60 deg F

Pipe is to be 10" SS Schedule 40

Pumps 3058-P1 & 3058-P2 are two 100% pumps set in parallel and will operate one at a time.

A booster pump (3058-P3) will be used to overcome the head produced by the operation of pump 3056-P3 in the forced main.

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 5
JOB ORDER NUMBER	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	
39390803	46	5	N/A	

Body of Calculation

Determine discharge head due to elevation

Lowest point is at pump location	1790 ft asl
Highest point @ building 3026	1837 ft asl
Discharge point	1814.5 ft asl
Net elev. difference (1814.5-1790)	24.5 ft

Discharge head due to friction (Case 1: pumps 3056-P3 and 3056-P4, idle)

Flow	500 gpm
Flow in cubic ft per second	1.114
Pipe Diameter (10" sch 40) *	0.835 ft
Pipe inside area	0.5473 sq. ft
Velocity (flow/area)	2.0354 fps
density	62.3 lbm/cu ft
viscosity	0.0008 lbm ft sec sq
Reynolds No. (density)Dv/(viscosity)	139317
E/D	1.80E-04
f (from Crane Tech. Paper)	0.018

\* length of 8" pipe (<10') is negligible

length of forced main	2000 ft
additional distance to Pump Tank	350 ft

fittings	quantity	k Value
45 el	8	16 f
90 el	30	30 f
gate	1	8 f
globe	1	340 f
tee (turn)	1	60 f
tee (run thru)	2	20 f

$$\text{sum } k = f(8*16+30*30+1*8+1*340+1*60+2*20) = 26.568$$

$$\text{Head loss (friction)} = (fLv^{**2}(.1863)/d) + ((\text{sum } k)(v^{**2})/(2*g))$$

$$= \boxed{4.97 \text{ ft}}$$

This gives the total discharge losses (head loss friction + head loss elev.) as

29.47 ft

**STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET**

CALCULATION IDENTIFICATION NUMBER				PAGE 6
JOB ORDER NUMBER 9390803	DIVISION & GROUP 46	CALCULATION NO. 5	OPTIONAL TASK CODE N/A	

**Suction Side Losses**

Elevation Loss (inlet is 12' below the pump) 12 ft

Frictional Losses (negligible for 12' pipe) 0 ft

Total for suction side 12 ft

Total Dynamic Head (Discharge side + Suction side) 41.47 ft

NPSHA ( $H_a + H_s - H_f(s) - H_{vp}$ ) = 21 ft

Water Pressure at Pumps 17.94 psi

Total Dynamic Head \* Density

Case 2: (CASE 2 IS TO DETERMINE HEAD THAT 3058-P3 IS REQUIRED TO DEVELOP AS THE BOOSTER PUMP FOR 3058-P OR 3058-P2 WHEN 3056-P4 OR 3056-P3 IS OPERATING AND DISCHARGING INTO THE SAME FORCED MAIN)

Flow**	3000 gpm
Flow in cubic ft per second	6.684
Pipe Diameter (10" sch 40) ***	0.835 ft
Pipe inside area	0.5473 sq. ft
Velocity (flow/area)	12.212 fps
density	62.3 lbm/cu ft
viscosity	0.0008 lbm ft sec sq
Reynolds No. (density)Dv/(viscosity)	835901
E/D	1.80E-04
f (from Crane Tech. Paper)	0.0145

\*\*flow of 3000 gpm will cause pump 3056-P1 to drop to approx. 2500 gpm, which is satisfactory.

\*\*\* length of 8" pipe (< 10') is negligible

Head loss (friction) = 144.05 ft

This gives the total discharge losses (head loss friction + head loss elev.) as

168.55 ft

Total Dynamic Head (Discharge side + Suction side) 180.55 ft

(THEREFORE, THE BOOSTER PUMP MUST PROVIDE THE DIFFERENCE IN CASE 2 AND CASE 1 (TDH) AT 500 GPM)

NPSHA ( $H_a + H_s - H_f(s) - H_{vp}$ ) = 62.5 ft

Water Pressure at Pumps 78.11 psi

Total Dynamic Head \* Density

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER

JOB ORDER NUMBER	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	PAGE
39390803	46	11	N/A	4

Objective:

Determine the TDH required at the maximum flow rate for the new boiling tub settling pits pumps (3056-P1 & 3056-P2)

Method:

Determine required total discharge head at the maximum flow rate in the new piping system using Darcy equations

Inputs:

Slightly slurried wastewater will be removed from the boiling tub settling pit at the rate of 500 gpm.

Pumped fluid is less than 2% pulp and therefore can be treated as water. (ref. 4)

Pipe is to be SS Schedule 40

Pumps 3056-P1 and 3056-P2 are parallel 100% pumps which will be running one at a time.

Pumps will be primed with filtered water prior to start-up.

Assumptions:

Fluid is at 80 degF.

# STONE & WEBSTER ENGINEERING CORPORATION CALCULATION SHEET

JOB ORDER NUMBER 9390803	CALCULATION IDENTIFICATION NUMBER		PAGE 5
	DIVISION & GROUP 46	CALCULATION NO. 11	

## Body of Calculation

Determine discharge head due to elevation

Lowest point is at pump location  
 Highest point  
 Discharge point  
 Net elev. difference (1816-1790)

1790 ft asl  
 1816 ft asl  
 1816 ft asl

26 ft

Discharge head due to friction

6 in. pipe

4 in. pipe

Flow  
 Flow in cubic ft per second  
 Pipe Diameter (sch 40)  
 Pipe inside area  
 Velocity (flow/area)  
 density  
 viscosity  
 Reynolds No. (density)Dv/(viscosity)  
 E/D

	500 gpm
	1.114
	0.3355 ft
	0.0884 sq. ft
	12.608 fps
	62.3 lbm/cu ft
	0.0008 lbm ft sec sq
	346735
	4.47E-04

f (from Crane Tech. Paper, ref. 2)

0.0175

0.0177

from ref. 1: length of 6" piping  
 length of 4" piping

470 ft

240 ft

fittings (6")

quantity

k Value

45 el

4

16 f

90 el

3

30 f

mixer fitting (est.)

1

60 f

gate

1

8 f

globe

1

340 f

tee (branch)

1

20 f

10.185

sum k = f((#\*k)n) =

Head loss (friction, 6" pipe & fittings) =  $(fLv^{**2}(.1863)/d) + ((sum k)(v^{**2})/(2*g))$

12.68 ft

Discharge subtotal

38.68 ft

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER

JOB ORDER NUMBER <b>39390803</b>	DIVISION & GROUP <b>46</b>	CALCULATION NO. <b>11</b>	OPTIONAL TASK CODE <b>N/A</b>	PAGE <b>6</b>
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fittings (4")	quantity	k Value
45 el	0	16 f
90 el	2	30 f
exit	1	50 f
tee (run)	14	20 f
globe	0	340 f
tee (branch)	1	60 f

sum k = f((#\*k)n) = 7.965

Head loss (friction, 4" pipe & fittings) =  $(fLv^{**2}(.1863)/d) + ((sum\ k)(v^{**2})/(2*g))$   
 = 50.90 ft

This gives the total discharge losses (head loss friction + head loss elev.) as  
89.58 ft

Suction Side Losses

Elevation Loss (inlet is 10' below the pump) 10 ft

Frictional Losses (negligible for 10' pipe) 0 ft

Total for suction side 10 ft

Total Dynamic Head (Discharge side + Suction side) 99.58 ft

Water Pressure at Pumps

Total Dynamic Head \* Density 43.08 psi

NPSHA (Ha + Hs - Hf(s) - Hvp) = 23 ft

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 4
JOB ORDER NUMBER	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	
39390803	46	13	N/A	

**Objective:**

Determine the TDH required at the maximum flow rate for the new boiling tub settling pits forced main pumps (3056-P3, 3056-P4, and 3056-P5)

**Method:**

Determine required total discharge head at the maximum flow rate in the new piping system using Darcy equations

**Inputs:**

Acid wastewater will be removed from the boiling tub settling pit at the rate of 3000 gpm (ref. 5), reference coordination meeting SWEC/Hercules 11-30-94

Acid wastewater is less than 1% acid and can be treated as water at 60 deg F

Pipe is to be 10" SS Schedule 40

Pumps 3056-P3 and 3056-P4 are parallel 100% pumps which will be running one at a time.

Pump 3056-P5 will be a pump for flows less than 1000 gpm.

Both pumps operations will be throttled and sequenced to control water hammer.

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER

JOB ORDER NUMBER 39390803	DIVISION & GROUP 46	CALCULATION NO. 13	OPTIONAL TASK CODE N/A	PAGE 5
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Body of Calculation

Determine discharge head due to elevation

Lowest point is at pump location	1790 ft asl
Highest point @ building 3026	1837 ft asl
Discharge point	1814.5 ft asl
Net elev. difference (1814.5-1790)	24.5 ft

Discharge head due to friction (case 1: full flow)

Flow	3000 gpm
Flow in cubic ft per second	6.684
Pipe Diameter (10" sch 40)	0.835 ft
Pipe inside area	0.5473 sq. ft
Velocity (flow/area)	12.212 fps
density	62.3 lbm/cu ft
viscosity	0.0008 lbm ft sec sq
Reynolds No. (density)Dv/(viscosity)	835901
E/D	1.80E-04

f (from Crane Tech. Paper, ref. 2) 0.0145

length of forced main, ref. 3 2000 ft  
 additional distance to new BTSP area 380 ft

fittings	quantity	k Value
45 el	8	16 f
90 el	30	30 f
gate	1	8 f
globe	1	340 f
tee (run thru)	3	20 f

sum k =  $f(8*16+30*30+1*8+1*340+3*20)$  20.822

Head loss (friction) =  $(fLv^{**2}(.1863)/d) + ((sum k)(v^{**2})/(2*g))$   
 = 143.91 ft

This gives the total discharge losses (head loss friction + head loss elev.) as

168.41 ft

STONE & WEBSTER ENGINEERING CORPORATION  
CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 6
JOB ORDER NUMBER	DIVISION & GROUP	CALCULATION NO.	OPTIONAL TASK CODE	
39390803	46	13	N/A	

Suction Side Losses

Elevation Loss (inlet is 10' below the pump) 10 ft

Frictional Losses (negligible for 10' pipe) 0 ft

Total for suction side 10 ft

Total Dynamic Head (Discharge side + Suction side) 178.41 ft

Water Pressure at Pumps

Total Dynamic Head \* Density 77.19 psi

Discharge head due to friction (case 2: flow @ 1000 gpm)

Flow	1000 gpm
Flow in cubic ft per second	2.228
Pipe Diameter (10" sch 40)	0.835 ft
Pipe inside area	0.5473 sq. ft
Velocity (flow/area)	4.0707 fps
density	62.3 lbm/cu ft
viscosity	0.0008 lbm ft sec sq
Reynolds No. (density)Dv/(viscosity)	278634
E/D :	1.80E-04
f (from Crane Tech. Paper, ref. 2)	0.0162

Head loss (friction) = 17.24 ft

Head loss (friction + elev.) = 41.74 ft

Total Dynamic Head (Discharge side + Suction side) 51.74 ft

Water Pressure at Pumps

Total Dynamic Head \* Density 22.38 psi

NPSHA (Ha + Hs - Hf(s) - Hvp) = 27 ft 23