CALCULATIONS

WATER LINE REPLACEMENT
VA MEDICAL CENTER
HAMPTON, VIRGINIA

Prepared By:

BOWMAN FOSTER & ASSOCIATES, PC
Consulting Engineers
#4 Interstate Corporate Center, Suite 1
Norfolk, VA 23502-4118

FINAL SUBMITTAL
August 23, 2012
BFA Project No. 11-005F
VA Project No.: 590-C20-240

CIVIL CALCULATIONS

Hydrant Test Results

City of Newport News
WATERWORKS

Distribution Engineering

Fire Flow Test Results

1/23/2012

Attention: Jack Bloom

Reference: **12 main serving the VAMC Meter 5786**

The Newport News Waterworks Engineering Division is returning your request for a fire flow. Please note that Waterworks recommends that all sprinkler systems be designed at a minimum of 20 psi below the static pressure. If I can be of any further assistance, please call me at (757) 926-1068.

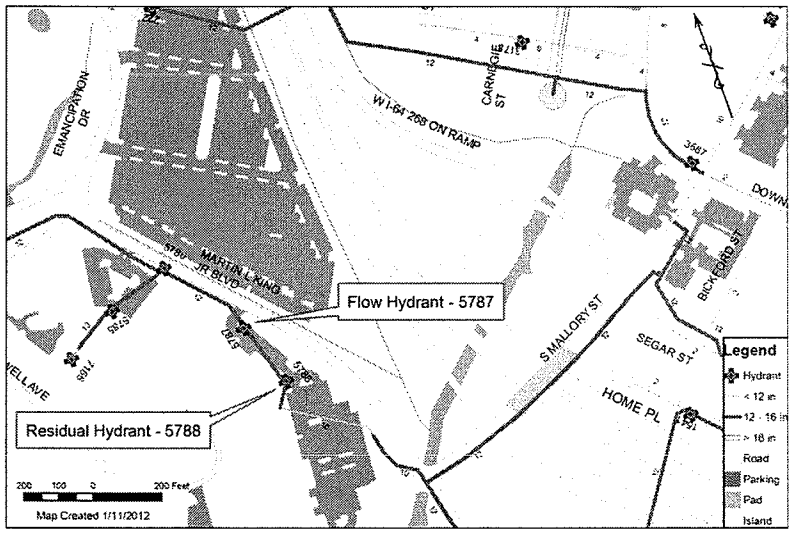
Chris Basford

Chris Basford, P.E.

TestDate: 1/20/2012 11:55:00 AM

Residual Hydrant No.:	5788	Flow Hydrant No.:	5787
Static Pressure:	63 psi	Nozzle Diameter:	2.50
Residual Pressure:	58 psi	Pitot Pressure:	44 psi
		Calculated Flow:	1114 gpm

Site Map



Hydrant Notes

A	Static Pressure	63 psi
B	Residual Pressure	58 psi
	Pitot Pressure	44 psi
Qf	Test Flow	1114 gpm
hr	A-Variable	
hf	A-B	

Qr	Qf	hr^.54	hf^.54	Residual Desired	Comments
4,376	1,114	9.37	2.38	0	
4,185	1,114	8.96	2.38	5	
3,986	1,114	8.53	2.38	10	
3,778	1,114	8.09	2.38	15	
3,561	1,114	7.62	2.38	20	Minimum Drawdown Pressure
3,331	1,114	7.13	2.38	25	
3,086	1,114	6.61	2.38	30	
2,824	1,114	6.05	2.38	35	
2,540	1,114	5.44	2.38	40	
2,225	1,114	4.76	2.38	45	
1,114	1,114	2.38	2.38	58.00	Flow Test
1,436	1,114	3.07	2.38	55	
0	1,114	0.00	2.38	63	Actual Pressure when Tested

Domestic Flow Calculation

Project: VAMC Water Line Replacement Project
BY: JIB
Date: 2/20/2012

Domestic Usage Calculation

(For use With Fire Flow Model)

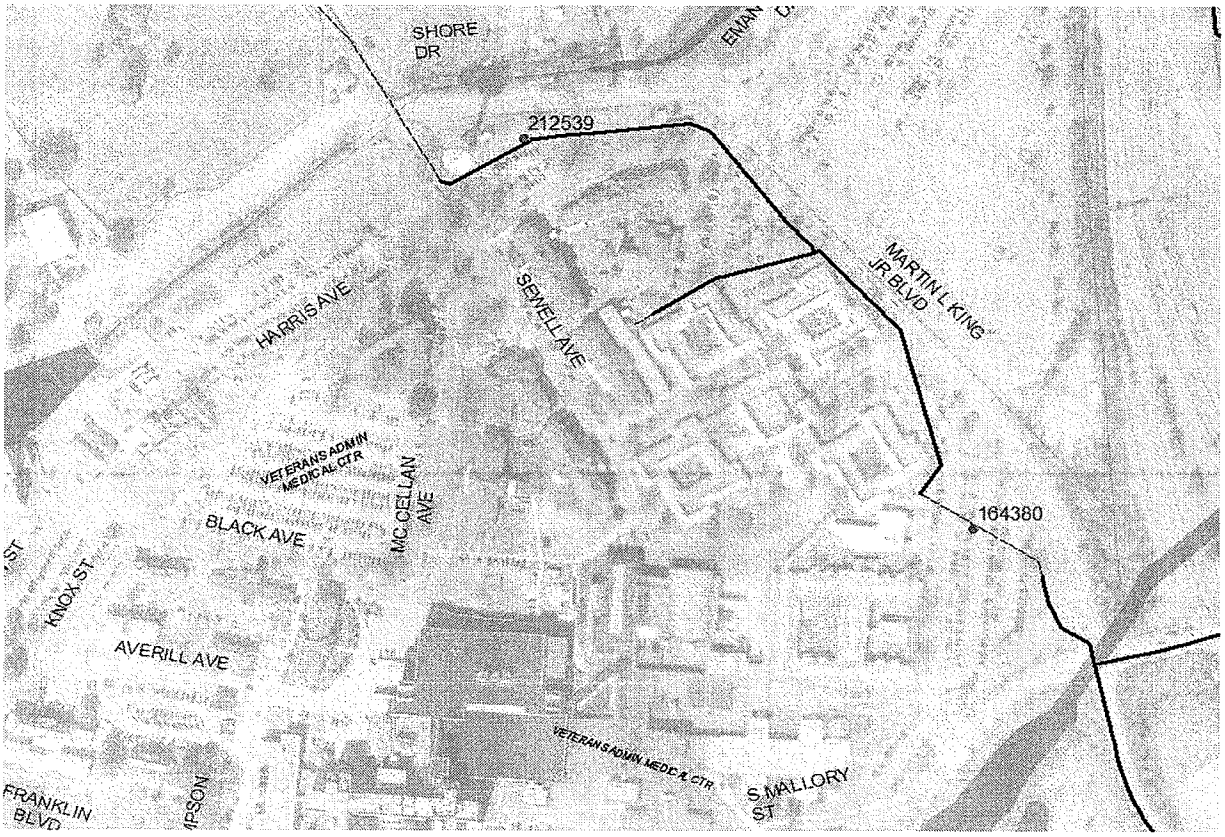
Meter Readings:	Meter	Average Monthly Usage (CCF)	
	212539	228.25	
	164380	3789.86	
		4018.11	Total

Daily Average Conversion: 4018.11 x 100 (CF/CCF) x 7.48 (Gal/CF) x (1 / (30 Days x 24Hours x60 Minutes))

= 69.57 Gal/Min (gpm)

Peak Factor (1.4x 1.4 = 1.96) 69.57x1.96= 136.36 Peak GPM

These values were computed using actual meter readings and giving the usage a peak hour factor of 1.96.
The valuse used in the Water Model are much higher for domestic equating to approximatley 600 gpm.
The 600 gpm was estimated by fixture count using the Internation Plumbing Code.


SHORE DR
212539
HARRIS AVE
SEWELL AVE
MARTIN L KING JR BLVD
VETERANS ADMIN MEDICAL CTR
MC CELLAN AVE
BLACK AVE
164380
KNOX ST
AVERILL AVE
VETERANS ADMIN MEDICAL CTR
S MALLORY ST
FRANKLIN BLVD

Device	Register	Meter reading date	Meter reading reason	Multiple allocation	Meter reading type	Meter Reading Status	Meter reading recorded	Usage
69727620	1	1/11/2012 01		X	01	7	10,043	
69727620	1	12/13/2011 01		X	01	7	10,043	0
69727620	1	11/29/2011 09		X	01	7	10,043	0
69727620	1	11/14/2011 01		X	01	7	10,043	0
69727620	1	10/12/2011 01		X	01	7	10,043	0
69727620	1	9/13/2011 01		X	01	7	10,043	0
69727620	1	8/11/2011 01		X	01	7	9,957	86
69727620	1	7/12/2011 01		X	01	7	9,820	137
69727620	1	6/13/2011 01		X	01	7	9,604	216
69727620	1	5/11/2011 01		X	01	7	9,342	262
69727620	1	4/12/2011 01		X	01	7	9,156	186
69727620	1	3/10/2011 01		X	01	7	9,156	0
69727620	1	2/10/2011 01		X	01	7	9,101	55
69727620	1	1/12/2011 01		X	01	7	8,817	284
69727620	1	12/10/2010 01		X	01	7	8,635	182
69727620	1	11/12/2010 01		X	01	7	8,332	303
69727620	1	10/13/2010 01		X	01	7	8,090	242
69727620	1	9/10/2010 01		X	01	7	7,519	571
69727620	1	8/12/2010 01		X	01	7	7,117	402
69727620	1	7/12/2010 01		X	01	7	6,531	586
69727620	1	6/10/2010 01		X	01	7	6,062	469
69727620	1	5/12/2010 01		X	01	7	5,792	270
69727620	1	4/12/2010 01		X	01	7	5,489	303
69727620	1	3/11/2010 01		X	01	7	5,236	253
69727620	1	2/18/2010 10		X	01	7	5,113	123
69727620	1	2/16/2010 10		X	01	7	5,103	10
69727620	1	2/11/2010 01		X	01	7	5,078	25
69727620	1	1/13/2010 01		X	01	7	4,218	860
69727620	1	12/10/2009 01		X	01	7	4,021	197
69727620	1	11/13/2009 01		X	01	7	3,855	166
69727620	1	10/12/2009 01		X	01	7	3,668	187
69727620	1	9/10/2009 01		X	01	7	3,413	255
69727620	1	8/12/2009 01		X	01	7	3,011	402
69727620	1	7/10/2009 01		X	01	7	2,694	317
69727620	1	6/11/2009 01		X	01	7	2,457	237
69727620	1	5/12/2009 01		X	01	7	2,284	173
69727620	1	4/10/2009 01		X	01	7	2,029	255
69727620	1	3/16/2009 10		X	01	7	1,627	402
69727620	1	3/11/2009 01		X	04	7	1,558	69
69727620	1	2/12/2009 09		X	01	7	1,187	371
69727620	1	2/11/2009 01		X	01	7	1,156	31
69727620	1	1/12/2009 01		X	01	7	834	322
69727620	1	12/11/2008 01		X	01	7	636	198
69727620	1	11/12/2008 01		X	01	7	464	172
69727620	1	10/9/2008 01		X	01	7	188	276
69727620	1	9/22/2008 21		X	01	7	0	188
							Totla Usage (CCF)	10,043
							Average Monthly Usage (CCF)	228.25

Device	Register	Meter reading date	Meter reading reason	Multiple allocation	Meter reading type	Meter Reading Status	Meter reading recorded	Usage
303041	1	1/11/2012 01	X	01	7		378,986	
303041	1	12/13/2011 01	X	01	7		375,939	3,047
303041	1	11/14/2011 01	X	01	7		372,780	3,159
303041	1	10/12/2011 01	X	01	7		369,067	3,713
303041	1	9/13/2011 01	X	01	7		364,838	4,229
303041	1	8/11/2011 01	X	01	7		360,695	4,143
303041	1	7/12/2011 01	X	01	7		355,805	4,890
303041	1	6/13/2011 01	X	01	7		351,631	4,174
303041	1	5/11/2011 01	X	01	7		346,559	5,072
303041	1	4/12/2011 01	X	01	7		342,470	4,089
303041	1	3/10/2011 01	X	01	7		338,645	3,825
303041	1	2/10/2011 01	X	01	7		335,321	3,324
303041	1	1/12/2011 01	X	01	7		332,373	2,948
303041	1	12/10/2010 01	X	01	7		329,287	3,086
303041	1	11/12/2010 01	X	01	7		325,826	3,461
303041	1	10/13/2010 01	X	01	7		321,833	3,993
303041	1	9/10/2010 01	X	01	7		317,916	3,917
303041	1	8/12/2010 01	X	01	7		313,486	4,430
303041	1	7/12/2010 01	X	01	7		308,562	4,924
303041	1	6/10/2010 01	X	01	7		304,455	4,107
303041	1	5/12/2010 01	X	01	7		300,885	3,570
303041	1	4/12/2010 01	X	01	7		295,208	5,677
303041	1	3/16/2010 09	X	01	7		292,117	3,091
303041	1	3/11/2010 01	X	01	7		291,598	519
303041	1	2/11/2010 01	X	01	7		288,851	2,747
303041	1	1/13/2010 01	X	01	7		286,485	2,366
303041	1	12/10/2009 01	X	01	7		282,928	3,557
303041	1	11/13/2009 01	X	01	7		278,675	4,253
303041	1	10/12/2009 01	X	01	7		275,362	3,313
303041	1	9/10/2009 01	X	01	7		271,715	3,647
303041	1	8/12/2009 01	X	01	7		267,934	3,781
303041	1	7/10/2009 01	X	01	7		263,532	4,402
303041	1	6/11/2009 01	X	01	7		259,792	3,740
303041	1	5/12/2009 01	X	01	7		255,847	3,945
303041	1	4/10/2009 01	X	01	7		252,319	3,528
303041	1	3/11/2009 01	X	01	7		249,408	2,911
303041	1	2/11/2009 01	X	01	7		246,259	3,149
303041	1	1/12/2009 01	X	01	7		242,547	3,712
303041	1	12/11/2008 01	X	01	7		239,918	2,629
303041	1	11/12/2008 01	X	01	7		237,320	2,598
303041	1	10/9/2008 01	X	01	7		234,056	3,264
303041	1	9/10/2008 01	X	01	7		230,937	3,119
303041	1	8/12/2008 01	X	01	7		227,240	3,697
303041	1	7/10/2008 01	X	01	7		223,274	3,966
303041	1	6/11/2008 01	X	01	7		219,828	3,446
303041	1	5/12/2008 01	X	01	7		216,449	3,379
303041	1	4/10/2008 01	X	01	7		213,256	3,193
303041	1	3/17/2008 09	X	01	7		210,511	2,745
303041	1	3/11/2008 01	X	01	7		209,825	686
303041	1	2/11/2008 01	X	01	7		206,811	3,014
303041	1	1/11/2008 01	X	01	7		203,831	2,980
303041	1	12/12/2007 01	X	01	7		201,001	2,830
303041	1	11/14/2007 01	X	01	7		198,154	2,847
303041	1	10/10/2007 01	X	01	7		193,672	4,482
303041	1	9/11/2007 01	X	01	7		190,273	3,399
303041	1	8/17/2007 09	X	01	7		187,341	2,932
303041	1	8/13/2007 01	X	01	7		186,828	513
303041	1	7/10/2007 01	X	01	7		182,340	4,488
303041	1	6/12/2007 06	X	01	7		178,246	4,094
303041	1	5/14/2007 09	X	01	1		174,774	3,472
303041	1	4/13/2007 09	X	01	1		170,129	4,645
303041	1	3/13/2007 09	X	01	1		165,467	4,662
303041	1	2/9/2007 09	X	01	1		162,835	2,632
303041	1	1/10/2007 09	X	01	1		160,038	2,797
303041	1	12/11/2006 09	X	01	1		157,098	2,940
303041	1	11/8/2006 09	X	01	1		153,600	3,498
303041	1	10/10/2006 09	X	01	1		150,253	3,347
303041	1	9/13/2006 09	X	01	1		147,264	2,989
303041	1	8/11/2006 09	X	01	1		141,108	6,156
303041	1	7/13/2006 09	X	01	1		135,722	5,386
303041	1	6/12/2006 09	X	01	1		130,832	4,890
303041	1	5/11/2006 09	X	01	1		126,663	4,169
303041	1	4/12/2006 09	X	01	1		122,953	3,710
303041	1	3/10/2006 09	X	01	1		117,710	5,243
303041	1	2/13/2006 09	X	01	1		114,582	3,128
303041	1	1/10/2006 09	X	01	1		110,242	4,340
303041	1	12/9/2005 09	X	01	1		106,515	3,727
303041	1	11/9/2005 09	X	01	1		102,948	3,567
303041	1	10/13/2005 09	X	01	1		98,642	4,306
303041	1	9/13/2005 09	X	01	1		94,130	4,512
303041	1	8/12/2005 09	X	01	1		88,501	5,629
303041	1	7/12/2005 09	X	01	1		83,217	5,284
303041	1	6/10/2005 09	X	01	1		77,821	5,396
303041	1	5/11/2005 09	X	01	1		73,473	4,348
303041	1	4/11/2005 09	X	01	1		68,749	4,724
303041	1	3/11/2005 09	X	01	1		63,345	5,404
303041	1	2/10/2005 09	X	01	1		59,468	3,877
303041	1	1/13/2005 09	X	01	1		56,306	3,162
303041	1	12/13/2004 09	X	01	1		53,027	3,279
303041	1	11/9/2004 09	X	01	1		49,365	3,662
303041	1	10/11/2004 09	X	01	1		46,018	3,347
303041	1	9/10/2004 09	X	01	1		41,774	4,244
303041	1	8/11/2004 09	X	01	1		37,073	4,701
303041	1	7/13/2004 09	X	01	1		32,325	4,748
303041	1	6/9/2004 09	X	01	1		27,412	4,913
303041	1	5/11/2004 09	X	01	1		23,189	4,223
303041	1	4/12/2004 09	X	01	1		19,328	3,861
303041	1	3/11/2004 09	X	01	1		15,570	3,758
303041	1	2/11/2004 09	X	01	1		12,028	3,542
303041	1	1/12/2004 09	X	01	1		8,062	3,966
303041	1	12/12/2003 09	X	01	1		4,123	3,939
303041	1	11/12/2003 21	X	01	1		0	4,123

Total (CCF)	378,986
AverageMonthly (CCF)	3,790

Water Line Replacement, Hampton, VAMC

EXISTING CONDITIONS					NEW WORK					
Mark	BUILDING FUNCTION	Pipe Size (")	Pipe Material	Type of Isolation Valve	Water fixture units (wfu)	Misc Demand (gpm)	Total Demand (gpm)	% of Total	Peak GPM	Bldg #
6	QUARTERS				23.2	0.0	20.0	0.30%	1.86	6
7,8,9,10,11	NEW ENGINEERING BUILDINGS				120.0	0.0	73.0	1.57%	9.64	7,8,9,10,11
13	EXPAND WOMENS CLINIC				127.3	0.0	75.0	1.66%	10.22	13
14	OEF / OIF CLINIC				59.3	8.0	62.0	0.77%	4.76	14
15	BOILER PLANT				28.3	61.0	101.0	0.37%	2.27	15
16	VACANT						-			16
17	CANTEEN				69.0	0.0	58.0	0.90%	5.54	17
18	STORAGE	N/A	N/A	N/A			N/A			18
27	A & MMS WAREHOUSE / ENGINEERING ELEC SHOP	2 1/2"	Cu	Gate	102.8	43.0	111.0	1.34%	8.26	27
28	ENGINEERING MECH SHOP	1 1/2"	Cu		42.9	0.0	48.0	0.56%	3.44	28
31	ENGINEERING CARP SHOP	2"	Cu	Gate	41.0	23.0	71.0	0.54%	3.29	31
33	NATIONAL LVA CHAPLAIN TRAINING CENTER	1 1/2"	Cu		18.8	0.0	34.0	0.25%	1.51	33
35	POST OFFICE / ENGINEERING ADMIN OFFICES				36.0	0.0	46.0	0.47%	2.89	35
36	FAC MGMT. SVC. / SECURITY / EMS				61.5	0.0	58.0	0.80%	4.94	36
37	SAFETY OFFICE / GROUNDS AND TRANSPORTATION				66.4	0.0	56.0	0.87%	5.33	37
43	IRM / UNION / SOCIAL WORKERS / HCMS				269.0	0.0	104.5	3.51%	21.61	43
48	CHAPEL				49.3	0.0	50.0	0.64%	3.96	48
50	VOLUNTARY SERVICE				133.3	0.0	77.0	1.74%	10.70	50
52	SALVATION ARMY				244.5	0.0	101.0	3.19%	19.64	52
61	VACANT						-			61
66	HRMS / HIMS / VRT / VOLUNTARY SERVICE				164.5	0.0	85.5	2.15%	13.21	66
69	VACANT	Building no longer there					-			69
70	VACANT	Building no longer there					-			70
71	VIRGINIA EMPLOYMENT AGENCY	3" PVC, then turns into Copper			170.5	0.0	85.5	2.23%	13.70	71
72	MEDICAL RESEARCH (VACANT)	Building no longer there					-			72
83	EDUCATION / TRAINING CENTER				62.4	5.0	63.0	0.82%	5.01	83
95	PAINT STORAGE						-			95
100	GAS PUMP						-			100
107	QUARTERS LAUNDRY						-			107
108	INCINERATOR						-			108
110	HOSPITAL / OPC				1243.9	110.0	349.0	16.25%	99.92	110
110A	CLINICAL ADDITION / LAUNDRY / SPD				267.0	58.0	161.0	3.49%	21.45	110A
110B	NEW AMBULATORY CARE FACILITY				1264.3	40.0	285.0	16.51%	101.55	110B
110C	MRI FACILITY				7.7	0.0	22.0	0.10%	0.61	110C
114	PALLIATIVE CARE	2"		Gate	203.6	0.0	91.0	2.66%	16.35	114
115	VACO NATIONAL CHAPLAIN CENTER RESIDENCE				54.0	0.0	52.0	0.71%	4.34	115
116	NUTRITION AND FOOD PRODUCTION SERVICES				258.5	23.0	127.5	3.38%	20.76	116
124	GARAGE						-			124
125	CEMETERY						-			125
127	FLAGPOLE	N/A	N/A	N/A	N/A		-			127
129	ELECTRICAL STORAGE BUILDING						-			129
130	EMERGENCY GENERATOR (BLDGS 69/70/71 & 72)	**********Need to verify					?			130
131	STORAGE (CANTEEN SERVICE)						-			131
132	STORAGE						-			132
133	STORAGE						-			133
135	EXECUTIVE OFCS/BUSINESS FNC / MCCR / QA				128.3	0.0	77.0	1.68%	10.31	135
137A	OUTPATIENT				73.3	0.0	61.2	0.96%	5.88	137A
137B	PSYCH WARD				371.4	0.0	127.0	4.85%	29.83	137B
137C	SCI				227.7	0.0	101.0	2.97%	18.29	137C
139	MAIN ELECTRICAL DISTRIBUTION BLDG (4160 V)						-			139
140	GAS METER	N/A	N/A	N/A	N/A		-			140
141	FUEL OIL TANKS	N/A	N/A	N/A	N/A		-			141
142	COOLING TOWER FOR BUILDING 135	1"		Gate	0.0	15.0	15.0	0.00%	0.00	142
143	COOLING TOWER FOR BUILDING 137	**********Need to verify					?			143
146	120 BED EXTENDED CARE AND REHAB CENTER				677.2	0.0	177.0	8.84%	54.39	146
147	COOLING TOWER FOR BUILDING 110A	See Building 142, There is only one cooling tower								147
148A	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5	2.80%	17.21	148A
148B	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5	2.80%	17.21	148B
148C	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5	2.80%	17.21	148C
148D	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5	2.80%	17.21	148D
148 S POD	DOMICILIARY CARE SERVICE (200 BED DOM)				73.3	0.0	61.2	0.96%	5.89	148 S POD
148T	ELECTRICAL SUBSTATION				53.3	0.0	54.0	0.70%	4.28	148T
150	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			150
151	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			151
152	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			152
154	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			154
155	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			155
156	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			156
158	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			158
159	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-			159
160	SUN SHELTER	N/A	N/A	N/A	N/A		-			160
161	SUN SHELTER	N/A	N/A	N/A	N/A		-			161
162	SUN SHELTER	N/A	N/A	N/A	N/A		-			162
163	SUN SHELTER	N/A	N/A	N/A	N/A		-			163
164	SUN SHELTER	N/A	N/A	N/A	N/A		-			164
165	PICNIC SHELTER	N/A	N/A	N/A	N/A		-			165
167	EMGCY GENERATOR BLDG (SERVES BLDG 137)						-			167
168	TELECOMMUNICATIONS UNIT / DATA MGMT UNIT	**********Need to verify					?			168
169	WATER TOWER									169
170	PICNIC SHELTER	N/A	N/A	N/A	N/A		-			170
171	EMERGENCY GENERATOR (110/110A/114)	N/A	N/A	N/A	N/A		-			171
172	OXYGEN STORAGE TANK	N/A	N/A	N/A	N/A		-			172
173	CWT BUILDING						-			173
173A	CWT PRODUCTION BUILDING				6.0	3.0	21.0	0.06%	0.48	173A
174	BOAT OWNER'S ASS. RESTROOM FACILITY	**********Need to verify					?			
175	POLICE BOAT SHED						-			
178	BASKETBALL COURT (SERVING BLDG 137)						-			
179	HAZARDOUS MATERIAL STORAGE BUILDING						-			
180	SMOKING SHELTER						-			
181	SUN SHELTER						-			
					7656.1	389.0	3543.4			
					Total Use GPM Use=		615.0	gpm		

Water Model Calculations

FIRE FLOW CALCULATIONS

Based on Insurance Services Office, Inc. (ISO) Method

PROJECT:	**VAMC Water Line Replacement**	PROJECT #:	03063
PHASE:	-	DESIGNED BY:	JIB
LOCATION:	Hampton, VA	DATE:	7/12/2012

I. CONSTRUCTION FACTOR (Ci)

Ci = 18 F (Ai) ^ 0.5 Ci = Construction Factor
F = Const. Class Coefficient
Ai = Effective Area

Effective Area - Ai = 465,468 Sq. Ft.**
Const. Class Coefficient - F = 1

Construction Factor - Ci = 12281

II. CONSTRUCTION CLASS COEFFICIENT (F)

	CONSTRUCTION CLASS		COEFFICIENT - F
	CLASS 1	Frame	1.5
x	CLASS 2	Joisted Masonry	1.0
	CLASS 3	Noncombustible	0.8
	CLASS 4	Masonry, Noncombustible	0.8
	CLASS 5	Modified Fire Resistive	0.6
	CLASS 6	Fire Resistive	0.6

III. OCCUPANCY FACTOR (Oi)

	COMBUSTIBILITY CLASS		FACTOR - Oi
	C-1	Noncombustible	0.75
X	C-2	Limited Combustible	0.85
	C-3	Combustible	1.00
	C-4	Free Burning	1.15
	C-5	Rapid Burning	1.25

Oi = 0.85

IV. EXPOSURES (Xi) AND COMMUNICATION (Pi) FACTORS

(Xi + Pi) =1.0 + Sum of (Xi + Pi) for each Bldg. Side (1.75 Maximum)

	Xi	Pi	(Xi + Pi)
Side 1 (N)	0.15		0.15
Side 2 (E)			
Side 3 (S)			
Side 4 (W)			
		Total	0.15

(Xi + Pi) = 1.15

V. NEEDED FIRE FLOW

Needed Fire Flow = NFF = (Ci) (Oi) (Xi + Pi) = 12004 GPM

[ ] Wood-shingle roof on subject or exposed bldg. (adds 500 GPM)

[X] Automatic Sprinkler System. (Reduce ISO flow by 50%)

Adjusted NFF = 6002 GPM

Round to the nearest 250 GPM if <2500 GPM =		GPM
Round to the nearest 500 GPM if >2500 GPM =	6000	GPM

** *Note: The Effective Area is the total area of the largest floor plus the area of 50% of all other floors. Firewalls are present.*

*1st Floor Area = 14,300 SF****
*2nd Floor Area = 14,300 SF****
*3rd Floor Area = 14,300 SF****

Eff. Area = [14,300 + (14,300 x 0.50) + (14,300 x 0.50)]

Eff. Area = 28,600 SF

*** *Note: When division walls are present, the maximum area on any one floor used shall be the largest undivided area plus 50% of the second largest undivided area on that floor.*

Largest Undivided Area = 12,643 SF
2nd Largest Undivided Area = 3,314 SF
Total Floor Area = 14,300 SF

Area Summary		(Square Feet)	Floors	Effective Area:
Largest Unsubdivided Area	BLDG 137:	94,163	1	94,163
Other Areas	BLDG 110B:	81,722	3	163,444
	BLDG 110 :	39,322	5	117,966
	110 Addition	15,539	5	46,617
	SCI Addition:	17,536	1	17,536
	137a Addition:	2,679	1	2,679
	BLDG 135 :	13,292	2	19,938
	BLDG 168:	3,125	1	3,125
			Total:	465,468

FIRE FLOW CALCULATIONS

Based on Insurance Services Office, Inc. (ISO) Method

PROJECT:	**VAMC Water Line Replacement**	PROJECT #:	03063
PHASE:	-	DESIGNED BY:	JIB
LOCATION:	Hampton, VA	DATE:	2/16/2012

I. CONSTRUCTION FACTOR (Ci)

Ci = 18 F (Ai) ^ 0.5 Ci = Construction Factor
F = Const. Class Coefficient
Ai = Effective Area

Effective Area - Ai =	25,091	Sq. Ft.**
Const. Class Coefficient - F =	1	
Construction Factor - Ci =	2851	

II. CONSTRUCTION CLASS COEFFICIENT (F)

	CONSTRUCTION CLASS		COEFFICIENT - F
	CLASS 1	Frame	1.5
x	CLASS 2	Joisted Masonry	1.0
	CLASS 3	Noncombustible	0.8
	CLASS 4	Masonry, Noncombustible	0.8
	CLASS 5	Modified Fire Resistive	0.6
	CLASS 6	Fire Resistive	0.6

III. OCCUPANCY FACTOR (Oi)

	COMBUSTIBILITY CLASS		FACTOR - Oi
	C-1	Noncombustible	0.75
X	C-2	Limited Combustible	0.85
	C-3	Combustible	1.00
	C-4	Free Burning	1.15
	C-5	Rapid Burning	1.25

Oi = 0.85

IV. EXPOSURES (Xi) AND COMMUNICATION (Pi) FACTORS

(Xi + Pi) =1.0 + Sum of (Xi + Pi) for each Bldg. Side (1.75 Maximum)

	Xi	Pi	(Xi + Pi)
Side 1 (N)	0.15		0.15
Side 2 (E)			
Side 3 (S)			
Side 4 (W)			
		Total	0.15

(Xi + Pi) = 1.15

V. NEEDED FIRE FLOW

Needed Fire Flow = NFF = (Ci) (Oi) (Xi + Pi) = 2787 GPM

[ ] Wood-shingle roof on subject or exposed bldg. (adds 500 GPM)

[X] Automatic Sprinkler System. (Reduce ISO flow by 50%)

Adjusted NFF = 1394 GPM

Round to the nearest 250 GPM if <2500 GPM =	1500	GPM
Round to the nearest 500 GPM if >2500 GPM =		GPM

** *Note: The Effective Area is the total area of the largest floor plus the area of 50% of all other floors.*

1st Floor Area = 22,479 SF (Open Parking Garage)

Because the parking garage is the "open" type and does not have a sprinkler system then the area can be excluded.

*2nd Floor Area = 18,819 SF****
*3rd Floor Area = 18,819 SF****
*4th Floor Area = 18,819 SF****

Eff. Area = [18,819 + (18,819 x 0.50) + (18,819 x 0.50)]

Eff. Area = 37,637 SF

*** *Note: When division walls are present, the maximum area on any one floor used shall be the largest undivided area plus 50% of the second largest undivided area on that floor.*

Largest Undivided Area = 15,158 SF
2nd Largest Undivided Area = 7,321 SF
Total Floor Area = 18,819 SF

Revisions	Date

Drawing Title	WATER MODEL NODE MAP
Project Title	VETERANS AFFAIRS MEDICAL CENTER
Building Number / SITE PLAN	Checked / Drawn
Location	VAMC HAMPTON, VIRGINIA
Date	AUGUST 21, 2012
Project No.	
DRAWING NO.	
DWG.	Of

Department of Veterans Affairs

```
* * * * * * * * * *  K Y P I P E 4  * * * * * * * * * *
*                                                       *
*    University of Kentucky Network Modeling Software   *
*                                                       *
*              Copyrighted by KYPIPE LLC                *
*                Version 3 - 11/01/2005                 *
*                                                       *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Date & Time: Tue Aug 21 14:06:48 2012

INPUT DATA FILENAME ---------- C:\KYPIPE~1\Jack\VAMC_Lar.DT2
TABULATED OUTPUT FILENAME -------- C:\KYPIPE~1\Jack\VAMC_Lar.OT2
POSTPROCESSOR RESULTS FILENAME --- C:\KYPIPE~1\Jack\VAMC_Lar.RS2

SUMMARY OF ORIGINAL DATA

UNITS SPECIFIED

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

PIPELINE DATA

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	VP-1	J-1	1.00	12.00	120.0000	1.32
P-10	J-9	J-10	210.00	8.00	120.0000	1.32
P-100	J-90	J-91	10.00	2.00	120.0000	0.00
P-101	J-62	J-60	150.00	8.00	120.0000	0.00
P-102	J-62	J-63	150.00	8.00	120.0000	0.00
P-103	J-53	J-6	80.00	8.00	120.0000	0.00
P-11	J-3	J-11	190.00	12.00	120.0000	1.32
P-12	J-11	J-12	185.00	12.00	120.0000	1.32
P-13	J-9	J-13	130.00	14.00	120.0000	1.32
P-14	J-13	J-90	20.00	6.00	120.0000	1.32
P-15	J-13	J-15	100.00	14.00	120.0000	1.32
P-16	J-15	J-16	210.00	14.00	120.0000	1.32
P-17	J-16	J-20	90.00	12.00	120.0000	1.32
P-18	J-18	J-17	180.00	6.00	120.0000	0.00
P-19	J-35	J-26	100.00	8.00	120.0000	0.00
P-2	J-1	J-2	250.00	12.00	66.0000	1.32
P-20	J-18	J-19	400.00	6.00	120.0000	1.32

P-21	J-20	J-18	170.00	8.00	120.0000	1.32
P-22	J-20	J-24	10.00	12.00	120.0000	1.32
P-23	J-22	J-21	120.00	6.00	120.0000	1.32
P-24	J-22	J-23	95.00	12.00	120.0000	1.32
P-25	J-23	J-89	60.00	12.00	120.0000	1.32
P-26	J-24	J-22	440.00	12.00	120.0000	1.32
P-27	J-23	J-29	180.00	12.00	120.0000	0.00
P-28	J-34	J-31	250.00	12.00	120.0000	0.00
P-29	J-37	J-27	6.47	6.00	120.0000	0.00
P-3	J-2	J-3	250.00	12.00	66.0000	1.32
P-30	J-37	J-25	180.00	8.00	120.0000	0.00
P-31	J-28	J-29	110.00	12.00	120.0000	1.32
P-32	J-28	J-36	330.00	12.00	120.0000	1.32
P-33	J-25	J-33	220.00	8.00	120.0000	0.00
P-34	J-31	J-30	260.00	12.00	120.0000	1.32
P-35	J-28	J-32	300.00	8.00	120.0000	0.00
P-36	J-42	J-65	50.00	12.00	120.0000	1.32
P-37	J-34	J-33	340.00	8.00	120.0000	1.32
P-38	J-35	J-34	80.00	12.00	120.0000	1.32
P-39	J-36	J-35	210.00	12.00	120.0000	7.55
P-4	J-3	J-4	670.00	12.00	66.0000	1.32
P-40	J-37	J-87	126.53	8.00	120.0000	1.32
P-41	J-1	J-89	40.00	8.00	120.0000	22.72
P-42	J-38	J-40	120.00	8.00	120.0000	1.32
P-43	J-40	J-41	20.00	8.00	120.0000	1.32
P-44	J-41	J-39	70.00	8.00	120.0000	1.32
P-45	J-39	J-42	180.00	12.00	120.0000	1.32
P-46	J-39	J-43	170.00	12.00	120.0000	1.32
P-47	J-87	J-31	153.47	8.00	120.0000	0.00
P-48	J-43	J-45	100.00	12.00	120.0000	1.32
P-49	J-16	J-46	190.00	12.00	120.0000	1.32
P-5	J-4	J-5	120.00	14.00	120.0000	1.32
P-50	J-46	J-47	120.00	12.00	120.0000	1.32
P-51	J-47	J-48	130.00	12.00	120.0000	1.32
P-52	J-45	J-48	70.00	12.00	120.0000	1.32
P-53	J-44	J-49	45.00	8.00	120.0000	1.32
P-54	J-47	J-50	130.00	8.00	120.0000	1.32
P-55	J-48	J-51	340.00	8.00	120.0000	1.32
P-56	J-51	J-14	50.00	8.00	120.0000	1.32
P-57	J-8	J-14	100.00	8.00	120.0000	1.32
P-58	J-8	J-7	200.00	8.00	120.0000	1.32
P-6	J-5	J-6	100.00	14.00	120.0000	1.32
P-60	J-53	J-58	170.00	8.00	120.0000	1.32
P-61	J-54	J-69	480.00	8.00	120.0000	1.32
P-62	J-54	J-56	200.00	6.00	120.0000	1.32
P-63	J-57	J-54	90.00	8.00	120.0000	1.32
P-64	J-58	J-57	150.00	8.00	120.0000	1.32
P-65	J-59	J-55	200.00	8.00	120.0000	1.32
P-66	J-64	J-59	40.00	8.00	120.0000	1.32
P-67	J-5	T-1	20.00	14.00	120.0000	1.32
P-68	J-88	J-4	20.00	14.00	120.0000	22.62
P-69	J-90	J-14	300.00	6.00	120.0000	0.00
P-7	J-6	J-7	60.00	14.00	120.0000	1.32
P-70	J-63	J-64	170.00	8.00	120.0000	1.32
P-71	J-65	J-85	140.00	8.00	120.0000	0.00
P-72	J-60	J-61	60.00	8.00	120.0000	1.32
P-73	J-68	J-66	50.00	6.00	120.0000	1.32

P-74	J-61	J-67	50.00	6.00	120.0000	0.00
P-75	J-61	J-68	190.00	8.00	120.0000	1.32
P-76	J-69	J-59	270.00	8.00	120.0000	1.32
P-77	J-68	J-70	320.00	8.00	120.0000	1.32
P-78	J-70	J-71	120.00	8.00	120.0000	1.32
P-79	J-71	J-72	280.00	8.00	120.0000	1.32
P-80	J-72	J-73	220.00	8.00	120.0000	1.32
P-81	J-73	J-60	180.00	8.00	120.0000	1.32
P-82	J-71	J-74	40.00	6.00	120.0000	1.32
P-83	J-70	J-78	40.00	8.00	120.0000	1.32
P-84	J-75	J-55	150.00	8.00	120.0000	1.32
P-85	J-76	J-75	180.00	8.00	120.0000	1.32
P-86	J-77	J-76	150.00	8.00	120.0000	1.32
P-87	J-78	J-77	20.00	8.00	120.0000	1.32
P-88	J-55	J-79	140.00	8.00	120.0000	0.00
P-89	J-78	J-80	40.00	6.00	120.0000	1.32
P-9	J-7	J-9	200.00	14.00	120.0000	1.32
P-90	J-77	J-81	100.00	6.00	120.0000	1.32
P-91	J-75	J-82	150.00	6.00	120.0000	1.32
P-92	J-82	J-83	200.00	6.00	120.0000	1.32
P-93	J-82	J-84	40.00	6.00	120.0000	1.32
P-94	J-76	J-85	290.00	8.00	120.0000	1.32
P-95	J-30	J-65	500.00	12.00	120.0000	1.32
P-96	J-49	J-79	290.00	8.00	120.0000	1.32
P-97	J-44	J-86	200.00	6.00	120.0000	1.32
P-98	J-44	J-45	80.00	8.00	120.0000	1.32
P-99	T-1	J-88	120.00	14.00	120.0000	1.32

P U M P/L O S S E L E M E N T D A T A

THERE IS A DEVICE AT NODE VP-1 DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
133.80	1114.00	75.00 (Default)
126.90	1436.00	75.00 (Default)
103.80	2225.00	75.00 (Default)
92.30	2540.00	75.00 (Default)
80.80	2824.00	75.00 (Default)
69.20	3086.00	75.00 (Default)
57.70	3331.00	75.00 (Default)
46.20	3561.00	75.00 (Default)
34.60	3778.00	75.00 (Default)
23.10	3986.00	75.00 (Default)
11.50	4185.00	75.00 (Default)

E N D N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)

J-1	0.00	1.00
J-2	0.00	1.00
J-3	0.00	1.00
J-4	0.00	1.00
J-5	0.00	1.00
J-6	0.00	1.00
J-7	0.00	1.00
J-8	0.00	1.00
J-9	0.00	1.00
J-10	31.39	1.00
J-11	0.00	1.00
J-12	0.00	1.00
J-13	0.00	1.00
J-14	51.95	1.00
J-15	0.00	1.00
J-16	20.76	1.00
J-17	0.00	1.00
J-18	5.89	1.00
J-19	17.21	1.00
J-20	0.00	1.00
J-21	4.28	1.00
J-22	0.00	1.00
J-23	0.00	1.00
J-24	0.00	1.00
J-25	0.00	1.00
J-26	22.00	1.00
J-27	100.00	1.00
J-28	0.00	1.00
J-29	88.81	1.00
J-30	1500.00	1.00
J-31	0.00	1.00
J-32	0.00	1.00
J-33	0.00	1.00
J-34	0.00	1.00
J-35	0.00	1.00
J-36	1000.00	1.00
J-37	1054.00	1.00
J-38	10.31	1.00
J-39	21.45	1.00
J-40	0.00	1.00
J-41	0.00	1.00
J-42	1000.00	1.00
J-43	1000.00	1.00
J-44	0.00	1.00
J-45	0.00	1.00
J-46	0.00	1.00
J-47	102.15	1.00
J-48	0.00	1.00
J-49	0.00	1.00
J-50	1000.00	1.00
J-51	0.00	1.00
J-53	0.00	1.00
J-54	0.00	1.00
J-55	0.00	1.00
J-56	0.00	1.00
J-57	0.00	1.00

J-58		3.96	1.00	
J-59		0.00	1.00	
J-60		0.00	1.00	
J-61		0.00	1.00	
J-62		8.26	1.00	
J-63		9.64	1.00	
J-64		2.27	1.00	
J-65		0.00	1.00	
J-66		0.00	1.00	
J-67		0.00	1.00	
J-68		6.73	1.00	
J-69		15.00	1.00	
J-70		0.00	1.00	
J-71		1.51	1.00	
J-72		0.00	1.00	
J-73		0.00	1.00	
J-74		0.00	1.00	
J-75		0.00	1.00	
J-76		0.00	1.00	
J-77		0.00	1.00	
J-78		16.35	1.00	
J-79		0.00	1.00	
J-80		0.00	1.00	
J-81		0.00	1.00	
J-82		13.16	1.00	
J-83		5.01	1.00	
J-84		0.00	1.00	
J-85		4.34	1.00	
J-86		0.00	18.75	
J-87		1000.00	1.00	
J-88	86	0.00	1.00	
J-89		0.00	1.00	
J-90		0.00	1.00	
J-91		0.00	1.00	
T-1		----	1.00	125.00
VP-1		----	1.00	1.00

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(p) = 101
NUMBER OF END NODES .....(j) = 90
NUMBER OF PRIMARY LOOPS .....(l) = 10
NUMBER OF SUPPLY NODES .....(f) = 2
NUMBER OF SUPPLY ZONES .....(z) = 1

==========

Case: 0

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.00000

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/HL/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	VP-1	J-1	1624.68	0.01	0.44	4.61	442.51	7.23
P-10	J-9	J-10	31.39	0.01	0.00	0.20	0.04	0.03
P-100	J-90	J-91	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-62	J-60	400.39	0.58	0.00	2.56	3.89	3.89
P-102	J-63	J-62	408.65	0.61	0.00	2.61	4.04	4.04
P-103	J-6	J-53	1059.37	1.89	0.00	6.76	23.58	23.58
P-11	J-3	J-11	0.00	0.00	0.00	0.00	0.00	0.00
P-12	J-11	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-13	J-9	J-13	4277.19	2.66	1.63	8.91	33.01	20.48
P-14	J-13	J-90	181.04	0.07	0.09	2.05	7.95	3.63
P-15	J-13	J-15	4096.15	1.89	1.49	8.54	33.84	18.91
P-16	J-15	J-16	4096.15	3.97	1.49	8.54	26.02	18.91
P-17	J-16	J-20	1387.54	0.49	0.32	3.94	8.92	5.39
P-18	J-18	J-17	0.00	0.00	0.00	0.00	0.00	0.00
P-19	J-35	J-26	22.00	0.00	0.00	0.14	0.02	0.02
P-2	J-1	J-2	77.92	0.02	0.00	0.22	0.08	0.08
P-20	J-18	J-19	17.21	0.02	0.00	0.20	0.05	0.05

P-21	J-20	J-18	23.10	0.00	0.00	0.15	0.02
0.02							
P-22	J-20	J-24	1364.44	0.05	0.31	3.87	35.93
5.23							
P-23	J-22	J-21	4.28	0.00	0.00	0.05	0.00
0.00							
P-24	J-22	J-23	1360.16	0.49	0.31	3.86	8.41
5.20							
P-25	J-89	J-23	1546.76	0.40	0.39	4.39	13.17
6.60							
P-26	J-24	J-22	1364.44	2.30	0.31	3.87	5.93
5.23							
P-27	J-23	J-29	2906.92	3.82	0.00	8.25	21.22
21.22							
P-28	J-34	J-31	1105.66	0.89	0.00	3.14	3.54
3.54							
P-29	J-37	J-27	100.00	0.01	0.00	1.13	1.21
1.21							
P-3	J-2	J-3	77.92	0.02	0.00	0.22	0.08
0.08							
P-30	J-25	J-37	690.45	1.92	0.00	4.41	10.67
10.67							
P-31	J-29	J-28	2818.11	2.20	1.31	7.99	31.94
20.04							
P-32	J-28	J-36	2818.11	6.61	1.31	7.99	24.01
20.04							
P-33	J-33	J-25	690.45	2.35	0.00	4.41	10.67
10.67							
P-34	J-30	J-31	357.89	0.11	0.02	1.02	0.52
0.44							
P-35	J-28	J-32	0.00	0.00	0.00	0.00	0.00
0.00							
P-36	J-42	J-65	1009.55	0.15	0.17	2.86	6.35
2.99							
P-37	J-34	J-33	690.45	3.63	0.40	4.41	11.84
10.67							
P-38	J-35	J-34	1796.11	0.70	0.53	5.09	15.35
8.70							
P-39	J-36	J-35	1818.11	1.87	3.12	5.16	23.75
8.90							
P-4	J-3	J-4	77.92	0.05	0.00	0.22	0.08
0.08							
P-40	J-87	J-37	463.55	0.65	0.18	2.96	6.52
5.10							
P-41	J-1	J-89	1546.76	1.90	34.38	9.87	906.98
47.52							
P-42	J-40	J-38	10.31	0.00	0.00	0.07	0.01
0.00							
P-43	J-41	J-40	10.31	0.00	0.00	0.07	0.01
0.00							
P-44	J-39	J-41	10.31	0.00	0.00	0.07	0.01
0.00							
P-45	J-39	J-42	2009.55	1.93	0.67	5.70	14.41
10.71							
P-46	J-43	J-39	2041.31	1.87	0.69	5.79	15.07
11.03							

P-47	J-31	J-87	1463.55	6.58	0.00	9.34	42.89	42.89
P-48	J-45	J-43	3041.31	2.31	1.53	8.63	38.33	23.07
P-49	J-16	J-46	2687.85	3.49	1.19	7.62	24.63	18.36
P-5	J-4	J-5	1293.58	0.27	0.15	2.70	3.48	2.24
P-50	J-46	J-47	2687.85	2.20	1.19	7.62	28.28	18.36
P-51	J-47	J-48	1585.70	0.90	0.41	4.50	10.10	6.91
P-52	J-48	J-45	2916.50	1.49	1.40	8.27	41.39	21.35
P-53	J-49	J-44	124.81	0.02	0.01	0.80	0.74	0.45
P-54	J-47	J-50	1000.00	2.75	0.83	6.38	27.61	21.19
P-55	J-51	J-48	1330.81	12.23	1.48	8.49	40.32	35.97
P-56	J-14	J-51	1330.81	1.80	1.48	8.49	65.54	35.97
P-57	J-8	J-14	1201.72	2.98	1.21	7.67	41.83	29.78
P-58	J-7	J-8	1201.72	5.96	1.21	7.67	35.80	29.78
P-6	J-5	J-6	6569.67	4.53	3.84	13.69	83.77	45.35
P-60	J-53	J-58	1059.37	4.01	0.94	6.76	29.09	23.58
P-61	J-54	J-69	1055.41	11.24	0.93	6.74	25.35	23.41
P-62	J-54	J-56	0.00	0.00	0.00	0.00	0.00	0.00
P-63	J-57	J-54	1055.41	2.11	0.93	6.74	33.74	23.41
P-64	J-58	J-57	1055.41	3.51	0.93	6.74	29.61	23.41
P-65	J-59	J-55	619.85	1.75	0.32	3.96	10.34	8.74
P-66	J-59	J-64	420.56	0.17	0.15	2.68	7.95	4.26
P-67	T-1	J-5	5276.08	0.60	2.48	11.00	154.10	30.21
P-68	J-88	J-4	1215.66	0.04	2.25	2.53	114.70	1.99
P-69	J-90	J-14	181.04	1.09	0.00	2.05	3.63	3.63
P-7	J-6	J-7	5510.29	1.96	2.70	11.48	77.79	32.74
P-70	J-64	J-63	418.29	0.72	0.15	2.67	5.08	4.22
P-71	J-85	J-65	848.33	2.19	0.00	5.41	15.62	15.62
P-72	J-60	J-61	219.36	0.08	0.04	1.40	1.95	1.28

P-73	J-68	J-66	0.00	0.00	0.00	0.00	0.00	0.00
P-74	J-61	J-67	0.00	0.00	0.00	0.00	0.00	0.00
P-75	J-61	J-68	219.36	0.24	0.04	1.40	1.49	1.28
P-76	J-69	J-59	1040.41	6.16	0.90	6.64	26.15	22.80
P-77	J-68	J-70	212.63	0.39	0.04	1.36	1.32	1.20
P-78	J-71	J-70	179.51	0.11	0.03	1.15	1.10	0.88
P-79	J-72	J-71	181.02	0.25	0.03	1.16	0.99	0.89
P-80	J-73	J-72	181.02	0.20	0.03	1.16	1.02	0.89
P-81	J-60	J-73	181.02	0.16	0.03	1.16	1.05	0.89
P-82	J-71	J-74	0.00	0.00	0.00	0.00	0.00	0.00
P-83	J-70	J-78	392.15	0.15	0.13	2.50	6.95	3.74
P-84	J-55	J-75	495.05	0.86	0.20	3.16	7.13	5.76
P-85	J-75	J-76	476.88	0.97	0.19	3.04	6.43	5.38
P-86	J-77	J-76	375.80	0.52	0.12	2.40	4.24	3.46
P-87	J-78	J-77	375.80	0.07	0.12	2.40	9.35	3.46
P-88	J-55	J-79	124.81	0.06	0.00	0.80	0.45	0.45
P-89	J-78	J-80	0.00	0.00	0.00	0.00	0.00	0.00
P-9	J-7	J-9	4308.58	4.15	1.65	8.98	29.02	20.76
P-90	J-77	J-81	0.00	0.00	0.00	0.00	0.00	0.00
P-91	J-75	J-82	18.17	0.01	0.00	0.21	0.06	0.05
P-92	J-82	J-83	5.01	0.00	0.00	0.06	0.01	0.00
P-93	J-82	J-84	0.00	0.00	0.00	0.00	0.00	0.00
P-94	J-76	J-85	852.67	4.57	0.61	5.44	17.86	15.77
P-95	J-65	J-30	1857.89	4.63	0.57	5.27	10.40	9.26
P-96	J-79	J-49	124.81	0.13	0.01	0.80	0.49	0.45
P-97	J-44	J-86	0.00	0.00	0.00	0.00	0.00	0.00
P-98	J-44	J-45	124.81	0.04	0.01	0.80	0.61	0.45
P-99	T-1	J-88	1215.66	0.24	0.13	2.53	3.09	1.99

P U M P/L O S S E L E M E N T R E S U L T S

#PUMPS	#PUMPS	NPSH	INLET	OUTLET	PUMP	EFFIC-	USEFUL	INCREMTL	TOTAL
NAME	FLOWRATE		HEAD	HEAD	HEAD	ENCY	POWER	COST	COST
PARALLEL	SERIES	Avail.							
	(gpm)	(ft)	(ft)	(ft)	(ft)	(%)	(Hp)	($)	($)
(ft)									
-1	1624.68	0.00	121.87	121.9	----	-----	---	----	
**	**	33.2							

E N D N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		0.00	122.43	1.00	121.43	52.62
J-2		0.00	122.41	1.00	121.41	52.61
J-3		0.00	122.39	1.00	121.39	52.60
J-4		0.00	122.34	1.00	121.34	52.58
J-5		0.00	121.92	1.00	120.92	52.40
J-6		0.00	113.54	1.00	112.54	48.77
J-7		0.00	108.87	1.00	107.87	46.75
J-8		0.00	101.71	1.00	100.71	43.64
J-9		0.00	103.07	1.00	102.07	44.23
J-10		31.39	103.06	1.00	102.06	44.23
J-11		0.00	122.39	1.00	121.39	52.60
J-12		0.00	122.39	1.00	121.39	52.60
J-13		0.00	98.78	1.00	97.78	42.37
J-14		51.95	97.53	1.00	96.53	41.83
J-15		0.00	95.39	1.00	94.39	40.90
J-16		20.76	89.93	1.00	88.93	38.54
J-17		0.00	89.12	1.00	88.12	38.19
J-18		5.89	89.12	1.00	88.12	38.19
J-19		17.21	89.10	1.00	88.10	38.18
J-20		0.00	89.13	1.00	88.13	38.19
J-21		4.28	86.16	1.00	85.16	36.90
J-22		0.00	86.16	1.00	85.16	36.90
J-23		0.00	85.36	1.00	84.36	36.56
J-24		0.00	88.77	1.00	87.77	38.03
J-25		0.00	57.52	1.00	56.52	24.49
J-26		22.00	65.12	1.00	64.12	27.78
J-27		100.00	55.59	1.00	54.59	23.66
J-28		0.00	78.03	1.00	77.03	33.38
J-29		88.81	81.54	1.00	80.54	34.90
J-30		1500.00	63.14	1.00	62.14	26.93
J-31		0.00	63.01	1.00	62.01	26.87
J-32		0.00	78.03	1.00	77.03	33.38

J-33		0.00	59.87	1.00	58.87	25.51
J-34		0.00	63.89	1.00	62.89	27.25
J-35		0.00	65.12	1.00	64.12	27.78
J-36		1000.00	70.11	1.00	69.11	29.95
J-37		1054.00	55.60	1.00	54.60	23.66
J-38		10.31	71.25	1.00	70.25	30.44
J-39		21.45	71.25	1.00	70.25	30.44
J-40		0.00	71.25	1.00	70.25	30.44
J-41		0.00	71.25	1.00	70.25	30.44
J-42		1000.00	68.66	1.00	67.66	29.32
J-43		1000.00	73.81	1.00	72.81	31.55
J-44		0.00	77.70	1.00	76.70	33.24
J-45		0.00	77.65	1.00	76.65	33.21
J-46		0.00	85.25	1.00	84.25	36.51
J-47		102.15	81.86	1.00	80.86	35.04
J-48		0.00	80.54	1.00	79.54	34.47
J-49		0.00	77.73	1.00	76.73	33.25
J-50		1000.00	78.27	1.00	77.27	33.48
J-51		0.00	94.25	1.00	93.25	40.41
J-53		0.00	111.66	1.00	110.66	47.95
J-54		0.00	99.23	1.00	98.23	42.57
J-55		0.00	77.94	1.00	76.94	33.34
J-56		0.00	99.23	1.00	98.23	42.57
J-57		0.00	102.27	1.00	101.27	43.88
J-58		3.96	106.71	1.00	105.71	45.81
J-59		0.00	80.00	1.00	79.00	34.24
J-60		0.00	77.63	1.00	76.63	33.21
J-61		0.00	77.52	1.00	76.52	33.16
J-62		8.26	78.22	1.00	77.22	33.46
J-63		9.64	78.82	1.00	77.82	33.72
J-64		2.27	79.69	1.00	78.69	34.10
J-65		0.00	68.34	1.00	67.34	29.18
J-66		0.00	77.23	1.00	76.23	33.03
J-67		0.00	77.52	1.00	76.52	33.16
J-68		6.73	77.23	1.00	76.23	33.03
J-69		15.00	87.06	1.00	86.06	37.29
J-70		0.00	76.81	1.00	75.81	32.85
J-71		1.51	76.94	1.00	75.94	32.91
J-72		0.00	77.22	1.00	76.22	33.03
J-73		0.00	77.45	1.00	76.45	33.13
J-74		0.00	76.94	1.00	75.94	32.91
J-75		0.00	76.87	1.00	75.87	32.88
J-76		0.00	75.71	1.00	74.71	32.37
J-77		0.00	76.35	1.00	75.35	32.65
J-78		16.35	76.53	1.00	75.53	32.73
J-79		0.00	77.87	1.00	76.87	33.31
J-80		0.00	76.53	1.00	75.53	32.73
J-81		0.00	76.35	1.00	75.35	32.65
J-82		13.16	76.86	1.00	75.86	32.87
J-83		5.01	76.86	1.00	75.86	32.87
J-84		0.00	76.86	1.00	75.86	32.87
J-85		4.34	70.53	1.00	69.53	30.13
J-86		0.00	77.70	18.75	58.95	25.54
J-87		1000.00	56.42	1.00	55.42	24.02
J-88	86	0.00	124.63	1.00	123.63	53.57
J-89		0.00	86.15	1.00	85.15	36.90
J-90		0.00	98.62	1.00	97.62	42.30

J-91	0.00	98.62	1.00	97.62	42.30
T-1	----	125.00	1.00	124.00	53.73
VP-1	----	122.87	1.00	121.87	52.81

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
T-1	6491.75	
VP-1	1624.68	

NET SYSTEM INFLOW = 8116.43
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 8116.43

***** HYDRAULIC ANALYSIS COMPLETED *****

```
* * * * * * * * * *  K Y P I P E 4  * * * * * * * * * *
*                                                       *
*    University of Kentucky Network Modeling Software   *
*                                                       *
*              Copyrighted by KYPIPE LLC                *
*                Version 3 - 11/01/2005                 *
*                                                       *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Date & Time: Tue Aug 21 14:12:53 2012

INPUT DATA FILENAME ---------- C:\KYPIPE~1\Jack\VAMC_Sma.DT2
TABULATED OUTPUT FILENAME -------- C:\KYPIPE~1\Jack\VAMC_Sma.OT2
POSTPROCESSOR RESULTS FILENAME --- C:\KYPIPE~1\Jack\VAMC_Sma.RS2

S U M M A R Y O F O R I G I N A L D A T A

U N I T S S P E C I F I E D

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

P I P E N A M E	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	VP-1	J-1	1.00	12.00	120.0000	1.32
P-10	J-9	J-10	210.00	8.00	120.0000	1.32
P-100	J-90	J-91	10.00	2.00	120.0000	0.00
P-101	J-62	J-60	150.00	8.00	120.0000	0.00
P-102	J-62	J-63	150.00	8.00	120.0000	0.00
P-103	J-53	J-6	80.00	8.00	120.0000	0.00
P-11	J-3	J-11	190.00	12.00	120.0000	1.32
P-12	J-11	J-12	185.00	12.00	120.0000	1.32
P-13	J-9	J-13	130.00	14.00	120.0000	1.32
P-14	J-13	J-90	20.00	6.00	120.0000	1.32
P-15	J-13	J-15	100.00	14.00	120.0000	1.32
P-16	J-15	J-16	210.00	14.00	120.0000	1.32
P-17	J-16	J-20	90.00	12.00	120.0000	1.32
P-18	J-18	J-17	180.00	6.00	120.0000	0.00
P-19	J-35	J-26	100.00	8.00	120.0000	0.00
P-2	J-1	J-2	250.00	12.00	66.0000	1.32
P-20	J-18	J-19	400.00	6.00	120.0000	1.32

P-21	J-20	J-18	170.00	8.00	120.0000	1.32
P-22	J-20	J-24	10.00	12.00	120.0000	1.32
P-23	J-22	J-21	120.00	6.00	120.0000	1.32
P-24	J-22	J-23	95.00	12.00	120.0000	1.32
P-25	J-23	J-89	60.00	12.00	120.0000	1.32
P-26	J-24	J-22	440.00	12.00	120.0000	1.32
P-27	J-23	J-29	180.00	12.00	120.0000	0.00
P-28	J-34	J-31	250.00	12.00	120.0000	0.00
P-29	J-37	J-27	6.47	6.00	120.0000	0.00
P-3	J-2	J-3	250.00	12.00	66.0000	1.32
P-30	J-37	J-25	180.00	8.00	120.0000	0.00
P-31	J-28	J-29	110.00	12.00	120.0000	1.32
P-32	J-28	J-36	330.00	12.00	120.0000	1.32
P-33	J-25	J-33	220.00	8.00	120.0000	0.00
P-34	J-31	J-30	260.00	12.00	120.0000	1.32
P-35	J-28	J-32	300.00	8.00	120.0000	0.00
P-36	J-42	J-65	50.00	12.00	120.0000	1.32
P-37	J-34	J-33	340.00	8.00	120.0000	1.32
P-38	J-35	J-34	80.00	12.00	120.0000	1.32
P-39	J-36	J-35	210.00	12.00	120.0000	7.55
P-4	J-3	J-4	670.00	12.00	66.0000	1.32
P-40	J-37	J-87	126.53	8.00	120.0000	1.32
P-41	J-1	J-89	40.00	8.00	120.0000	22.72
P-42	J-38	J-40	120.00	8.00	120.0000	1.32
P-43	J-40	J-41	20.00	8.00	120.0000	1.32
P-44	J-41	J-39	70.00	8.00	120.0000	1.32
P-45	J-39	J-42	180.00	12.00	120.0000	1.32
P-46	J-39	J-43	170.00	12.00	120.0000	1.32
P-47	J-87	J-31	153.47	8.00	120.0000	0.00
P-48	J-43	J-45	100.00	12.00	120.0000	1.32
P-49	J-16	J-46	190.00	12.00	120.0000	1.32
P-5	J-4	J-5	120.00	14.00	120.0000	1.32
P-50	J-46	J-47	120.00	12.00	120.0000	1.32
P-51	J-47	J-48	130.00	12.00	120.0000	1.32
P-52	J-45	J-48	70.00	12.00	120.0000	1.32
P-53	J-44	J-49	45.00	8.00	120.0000	1.32
P-54	J-47	J-50	130.00	8.00	120.0000	1.32
P-55	J-48	J-51	340.00	8.00	120.0000	1.32
P-56	J-51	J-14	50.00	8.00	120.0000	1.32
P-57	J-8	J-14	100.00	8.00	120.0000	1.32
P-58	J-8	J-7	200.00	8.00	120.0000	1.32
P-6	J-5	J-6	100.00	14.00	120.0000	1.32
P-60	J-53	J-58	170.00	8.00	120.0000	1.32
P-61	J-54	J-69	480.00	8.00	120.0000	1.32
P-62	J-54	J-56	200.00	6.00	120.0000	1.32
P-63	J-57	J-54	90.00	8.00	120.0000	1.32
P-64	J-58	J-57	150.00	8.00	120.0000	1.32
P-65	J-59	J-55	200.00	8.00	120.0000	1.32
P-66	J-64	J-59	40.00	8.00	120.0000	1.32
P-67	J-5	T-1	20.00	14.00	120.0000	1.32
P-68	J-88	J-4	20.00	14.00	120.0000	22.62
P-69	J-90	J-14	300.00	6.00	120.0000	0.00
P-7	J-6	J-7	60.00	14.00	120.0000	1.32
P-70	J-63	J-64	170.00	8.00	120.0000	1.32
P-71	J-65	J-85	140.00	8.00	120.0000	0.00
P-72	J-60	J-61	60.00	8.00	120.0000	1.32
P-73	J-68	J-66	50.00	6.00	120.0000	1.32

P-74	J-61	J-67	50.00	6.00	120.0000	0.00
P-75	J-61	J-68	190.00	8.00	120.0000	1.32
P-76	J-69	J-59	270.00	8.00	120.0000	1.32
P-77	J-68	J-70	320.00	8.00	120.0000	1.32
P-78	J-70	J-71	120.00	8.00	120.0000	1.32
P-79	J-71	J-72	280.00	8.00	120.0000	1.32
P-80	J-72	J-73	220.00	8.00	120.0000	1.32
P-81	J-73	J-60	180.00	8.00	120.0000	1.32
P-82	J-71	J-74	40.00	6.00	120.0000	1.32
P-83	J-70	J-78	40.00	8.00	120.0000	1.32
P-84	J-75	J-55	150.00	8.00	120.0000	1.32
P-85	J-76	J-75	180.00	8.00	120.0000	1.32
P-86	J-77	J-76	150.00	8.00	120.0000	1.32
P-87	J-78	J-77	20.00	8.00	120.0000	1.32
P-88	J-55	J-79	140.00	8.00	120.0000	0.00
P-89	J-78	J-80	40.00	6.00	120.0000	1.32
P-9	J-7	J-9	200.00	14.00	120.0000	1.32
P-90	J-77	J-81	100.00	6.00	120.0000	1.32
P-91	J-75	J-82	150.00	6.00	120.0000	1.32
P-92	J-82	J-83	200.00	6.00	120.0000	1.32
P-93	J-82	J-84	40.00	6.00	120.0000	1.32
P-94	J-76	J-85	290.00	8.00	120.0000	1.32
P-95	J-30	J-65	500.00	12.00	120.0000	1.32
P-96	J-49	J-79	290.00	8.00	120.0000	1.32
P-97	J-44	J-86	200.00	6.00	120.0000	1.32
P-98	J-44	J-45	80.00	8.00	120.0000	1.32
P-99	T-1	J-88	120.00	14.00	120.0000	1.32

P U M P/L O S S E L E M E N T D A T A

THERE IS A DEVICE AT NODE VP-1 DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
133.80	1114.00	75.00 (Default)
126.90	1436.00	75.00 (Default)
103.80	2225.00	75.00 (Default)
92.30	2540.00	75.00 (Default)
80.80	2824.00	75.00 (Default)
69.20	3086.00	75.00 (Default)
57.70	3331.00	75.00 (Default)
46.20	3561.00	75.00 (Default)
34.60	3778.00	75.00 (Default)
23.10	3986.00	75.00 (Default)
11.50	4185.00	75.00 (Default)

E N D N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)

J-1	0.00	1.00
J-2	0.00	1.00
J-3	0.00	1.00
J-4	0.00	1.00
J-5	0.00	1.00
J-6	0.00	1.00
J-7	0.00	1.00
J-8	0.00	1.00
J-9	0.00	1.00
J-10	31.39	1.00
J-11	0.00	1.00
J-12	0.00	1.00
J-13	0.00	1.00
J-14	51.95	1.00
J-15	0.00	1.00
J-16	20.76	1.00
J-17	0.00	1.00
J-18	5.89	1.00
J-19	17.21	1.00
J-20	0.00	1.00
J-21	4.28	1.00
J-22	0.00	1.00
J-23	0.00	1.00
J-24	0.00	1.00
J-25	0.00	1.00
J-26	22.00	1.00
J-27	100.00	1.00
J-28	0.00	1.00
J-29	88.81	1.00
J-30	0.00	1.00
J-31	0.00	1.00
J-32	0.00	1.00
J-33	0.00	1.00
J-34	0.00	1.00
J-35	0.00	1.00
J-36	0.00	1.00
J-37	54.00	1.00
J-38	10.31	1.00
J-39	21.45	1.00
J-40	0.00	1.00
J-41	0.00	1.00
J-42	0.00	1.00
J-43	0.00	1.00
J-44	0.00	1.00
J-45	0.00	1.00
J-46	0.00	1.00
J-47	102.15	1.00
J-48	0.00	1.00
J-49	0.00	1.00
J-50	0.00	1.00
J-51	0.00	1.00
J-53	0.00	1.00
J-54	0.00	1.00
J-55	0.00	1.00
J-56	0.00	1.00
J-57	0.00	1.00

J-58		3.96	1.00	
J-59		0.00	1.00	
J-60		0.00	1.00	
J-61		0.00	1.00	
J-62		8.26	1.00	
J-63		9.64	1.00	
J-64		2.27	1.00	
J-65		0.00	1.00	
J-66		750.00	1.00	
J-67		750.00	1.00	
J-68		6.73	1.00	
J-69		15.00	1.00	
J-70		0.00	1.00	
J-71		1.51	1.00	
J-72		0.00	1.00	
J-73		0.00	1.00	
J-74		0.00	1.00	
J-75		0.00	1.00	
J-76		0.00	1.00	
J-77		0.00	1.00	
J-78		16.35	1.00	
J-79		0.00	1.00	
J-80		0.00	1.00	
J-81		0.00	1.00	
J-82		13.16	1.00	
J-83		5.01	1.00	
J-84		0.00	1.00	
J-85		4.34	1.00	
J-86		0.00	18.75	
J-87		0.00	1.00	
J-88	86	0.00	1.00	
J-89		0.00	1.00	
J-90		0.00	1.00	
J-91		0.00	1.00	
T-1		----	1.00	125.00
VP-1		----	1.00	1.00

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(p) = 101
NUMBER OF END NODES .....(j) = 90
NUMBER OF PRIMARY LOOPS .....(l) = 10
NUMBER OF SUPPLY NODES .....(f) = 2
NUMBER OF SUPPLY ZONES .....(z) = 1

==========

Case: 0

RESULTS OBTAINED AFTER 7 TRIALS: ACCURACY = 0.00000

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

P I P E N A M E	NODE NUMBERS #1	#2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/ HL/ 1000 (ft/ft)
P-1	VP-1	J-1	1327.40	0.00	0.29	3.77	295.53 4.97
P-10	J-9	J-10	31.39	0.01	0.00	0.20	0.04 0.03
P-100	J-90	J-91	0.00	0.00	0.00	0.00	0.00 0.00
P-101	J-62	J-60	679.20	1.55	0.00	4.33	10.35 10.35
P-102	J-63	J-62	687.46	1.59	0.00	4.39	10.58 10.58
P-103	J-6	J-53	441.92	0.37	0.00	2.82	4.67 4.67
P-11	J-3	J-11	0.00	0.00	0.00	0.00	0.00 0.00
P-12	J-11	J-12	0.00	0.00	0.00	0.00	0.00 0.00
P-13	J-9	J-13	737.36	0.10	0.05	1.54	1.16 0.79
P-14	J-13	J-90	73.78	0.01	0.01	0.84	1.41 0.69
P-15	J-13	J-15	663.58	0.06	0.04	1.38	1.04 0.65
P-16	J-15	J-16	663.58	0.14	0.04	1.38	0.84 0.65
P-17	J-20	J-16	58.13	0.00	0.00	0.16	0.02 0.02
P-18	J-18	J-17	0.00	0.00	0.00	0.00	0.00 0.00
P-19	J-35	J-26	22.00	0.00	0.00	0.14	0.02 0.02
P-2	J-1	J-2	675.41	1.08	0.08	1.92	4.60 4.30
P-20	J-18	J-19	17.21	0.02	0.00	0.20	0.05 0.05

P-21	J-20	J-18	23.10	0.00	0.00	0.15	0.02
0.02							
P-22	J-24	J-20	81.23	0.00	0.00	0.23	0.14
0.03							
P-23	J-22	J-21	4.28	0.00	0.00	0.05	0.00
0.00							
P-24	J-23	J-22	85.51	0.00	0.00	0.24	0.04
0.03							
P-25	J-89	J-23	651.99	0.08	0.07	1.85	2.50
1.33							
P-26	J-22	J-24	81.23	0.01	0.00	0.23	0.03
0.03							
P-27	J-23	J-29	566.49	0.18	0.00	1.61	1.03
1.03							
P-28	J-34	J-31	371.81	0.12	0.00	1.05	0.47
0.47							
P-29	J-37	J-27	100.00	0.01	0.00	1.13	1.21
1.21							
P-3	J-2	J-3	675.41	1.08	0.08	1.92	4.60
4.30							
P-30	J-25	J-37	83.87	0.04	0.00	0.54	0.22
0.22							
P-31	J-29	J-28	477.68	0.08	0.04	1.35	1.09
0.75							
P-32	J-28	J-36	477.68	0.25	0.04	1.35	0.86
0.75							
P-33	J-33	J-25	83.87	0.05	0.00	0.54	0.22
0.22							
P-34	J-31	J-30	301.68	0.08	0.02	0.86	0.38
0.32							
P-35	J-28	J-32	0.00	0.00	0.00	0.00	0.00
0.00							
P-36	J-42	J-65	333.90	0.02	0.02	0.95	0.75
0.39							
P-37	J-34	J-33	83.87	0.07	0.01	0.54	0.23
0.22							
P-38	J-35	J-34	455.68	0.05	0.03	1.29	1.11
0.69							
P-39	J-36	J-35	477.68	0.16	0.22	1.35	1.77
0.75							
P-4	J-3	J-4	675.41	2.88	0.08	1.92	4.41
4.30							
P-40	J-87	J-37	70.13	0.02	0.00	0.45	0.19
0.15							
P-41	J-1	J-89	651.99	0.38	6.11	4.16	162.30
9.60							
P-42	J-40	J-38	10.31	0.00	0.00	0.07	0.01
0.00							
P-43	J-41	J-40	10.31	0.00	0.00	0.07	0.01
0.00							
P-44	J-39	J-41	10.31	0.00	0.00	0.07	0.01
0.00							
P-45	J-39	J-42	333.90	0.07	0.02	0.95	0.49
0.39							
P-46	J-43	J-39	365.66	0.08	0.02	1.04	0.59
0.46							

P-47	J-31	J-87	70.13	0.02	0.00	0.45	0.15
0.15							
P-48	J-45	J-43	365.66	0.05	0.02	1.04	0.68
0.46							
P-49	J-16	J-46	700.95	0.29	0.08	1.99	1.95
1.52							
P-5	J-4	J-5	602.27	0.07	0.03	1.26	0.81
0.54							
P-50	J-46	J-47	700.95	0.18	0.08	1.99	2.20
1.52							
P-51	J-47	J-48	598.80	0.15	0.06	1.70	1.59
1.14							
P-52	J-48	J-45	874.39	0.16	0.13	2.48	4.09
2.29							
P-53	J-44	J-49	508.73	0.27	0.22	3.25	10.86
6.06							
P-54	J-47	J-50	0.00	0.00	0.00	0.00	0.00
0.00							
P-55	J-51	J-48	275.59	0.66	0.06	1.76	2.13
1.95							
P-56	J-14	J-51	275.59	0.10	0.06	1.76	3.22
1.95							
P-57	J-8	J-14	253.77	0.17	0.05	1.62	2.21
1.67							
P-58	J-7	J-8	253.77	0.33	0.05	1.62	1.94
1.67							
P-6	J-5	J-6	1464.44	0.28	0.19	3.05	4.72
2.81							
P-60	J-53	J-58	441.92	0.79	0.16	2.82	5.63
4.67							
P-61	J-54	J-69	437.96	2.20	0.16	2.80	4.93
4.59							
P-62	J-54	J-56	0.00	0.00	0.00	0.00	0.00
0.00							
P-63	J-57	J-54	437.96	0.41	0.16	2.80	6.37
4.59							
P-64	J-58	J-57	437.96	0.69	0.16	2.80	5.66
4.59							
P-65	J-55	J-59	276.41	0.39	0.06	1.76	2.28
1.96							
P-66	J-59	J-64	699.37	0.44	0.41	4.46	21.13
10.93							
P-67	T-1	J-5	862.16	0.02	0.07	1.80	4.36
1.05							
P-68	J-4	J-88	73.13	0.00	0.01	0.15	0.42
0.01							
P-69	J-90	J-14	73.78	0.21	0.00	0.84	0.69
0.69							
P-7	J-6	J-7	1022.51	0.09	0.09	2.13	3.00
1.45							
P-70	J-64	J-63	697.10	1.85	0.41	4.45	13.25
10.86							
P-71	J-65	J-85	635.58	1.28	0.00	4.06	9.15
9.15							
P-72	J-60	J-61	897.38	1.04	0.67	5.73	28.54
17.34							

P-73	J-68	J-66	750.00	2.52	1.48	8.51	80.17
50.48							
P-74	J-61	J-67	750.00	2.52	0.00	8.51	50.48
50.48							
P-75	J-61	J-68	147.38	0.12	0.02	0.94	0.71
0.61							
P-76	J-69	J-59	422.96	1.16	0.15	2.70	4.86
4.31							
P-77	J-70	J-68	609.35	2.71	0.31	3.89	9.43
8.47							
P-78	J-70	J-71	219.68	0.15	0.04	1.40	1.62
1.28							
P-79	J-71	J-72	218.17	0.35	0.04	1.39	1.41
1.26							
P-80	J-72	J-73	218.17	0.28	0.04	1.39	1.44
1.26							
P-81	J-73	J-60	218.17	0.23	0.04	1.39	1.48
1.26							
P-82	J-71	J-74	0.00	0.00	0.00	0.00	0.00
0.00							
P-83	J-78	J-70	829.04	0.60	0.57	5.29	29.32
14.97							
P-84	J-55	J-75	232.32	0.21	0.05	1.48	1.72
1.42							
P-85	J-75	J-76	214.15	0.22	0.04	1.37	1.43
1.22							
P-86	J-76	J-77	845.39	2.33	0.60	5.40	19.50
15.52							
P-87	J-77	J-78	845.39	0.31	0.60	5.40	45.35
15.52							
P-88	J-79	J-55	508.73	0.85	0.00	3.25	6.06
6.06							
P-89	J-78	J-80	0.00	0.00	0.00	0.00	0.00
0.00							
P-9	J-7	J-9	768.75	0.17	0.05	1.60	1.12
0.85							
P-90	J-77	J-81	0.00	0.00	0.00	0.00	0.00
0.00							
P-91	J-75	J-82	18.17	0.01	0.00	0.21	0.06
0.05							
P-92	J-82	J-83	5.01	0.00	0.00	0.06	0.01
0.00							
P-93	J-82	J-84	0.00	0.00	0.00	0.00	0.00
0.00							
P-94	J-85	J-76	631.24	2.62	0.33	4.03	10.18
9.04							
P-95	J-30	J-65	301.68	0.16	0.02	0.86	0.35
0.32							
P-96	J-49	J-79	508.73	1.76	0.22	3.25	6.81
6.06							
P-97	J-44	J-86	0.00	0.00	0.00	0.00	0.00
0.00							
P-98	J-45	J-44	508.73	0.48	0.22	3.25	8.76
6.06							
P-99	J-88	T-1	73.13	0.00	0.00	0.15	0.01
0.01							

P U M P/L O S S E L E M E N T R E S U L T S

#PUMPS	#PUMPS	NPSH	INLET	OUTLET	PUMP	EFFIC-	USEFUL	INCREMTL	TOTAL
NAME	FLOWRATE		HEAD	HEAD	HEAD	ENCY	POWER	COST	COST
PARALLEL	SERIES	Avail.							
	(gpm)	(ft)	(ft)	(ft)	(ft)	(%)	(Hp)	($)	($)
(ft)									
-1	1327.40	0.00	129.57	129.6	----	-----	---	----	
**	**	33.2							

E N D N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		0.00	130.27	1.00	129.27	56.02
J-2		0.00	129.12	1.00	128.12	55.52
J-3		0.00	127.97	1.00	126.97	55.02
J-4		0.00	125.01	1.00	124.01	53.74
J-5		0.00	124.91	1.00	123.91	53.70
J-6		0.00	124.44	1.00	123.44	53.49
J-7		0.00	124.26	1.00	123.26	53.41
J-8		0.00	123.87	1.00	122.87	53.24
J-9		0.00	124.04	1.00	123.04	53.32
J-10		31.39	124.03	1.00	123.03	53.31
J-11		0.00	127.97	1.00	126.97	55.02
J-12		0.00	127.97	1.00	126.97	55.02
J-13		0.00	123.89	1.00	122.89	53.25
J-14		51.95	123.65	1.00	122.65	53.15
J-15		0.00	123.78	1.00	122.78	53.21
J-16		20.76	123.61	1.00	122.61	53.13
J-17		0.00	123.60	1.00	122.60	53.13
J-18		5.89	123.60	1.00	122.60	53.13
J-19		17.21	123.59	1.00	122.59	53.12
J-20		0.00	123.61	1.00	122.61	53.13
J-21		4.28	123.62	1.00	122.62	53.14
J-22		0.00	123.62	1.00	122.62	53.14
J-23		0.00	123.63	1.00	122.63	53.14
J-24		0.00	123.61	1.00	122.61	53.13
J-25		0.00	122.45	1.00	121.45	52.63
J-26		22.00	122.66	1.00	121.66	52.72
J-27		100.00	122.40	1.00	121.40	52.61
J-28		0.00	123.32	1.00	122.32	53.01
J-29		88.81	123.44	1.00	122.44	53.06
J-30		0.00	122.36	1.00	121.36	52.59
J-31		0.00	122.46	1.00	121.46	52.63
J-32		0.00	123.32	1.00	122.32	53.01

J-33		0.00	122.50	1.00	121.50	52.65
J-34		0.00	122.58	1.00	121.58	52.68
J-35		0.00	122.67	1.00	121.67	52.72
J-36		0.00	123.04	1.00	122.04	52.88
J-37		54.00	122.41	1.00	121.41	52.61
J-38		10.31	122.31	1.00	121.31	52.57
J-39		21.45	122.31	1.00	121.31	52.57
J-40		0.00	122.31	1.00	121.31	52.57
J-41		0.00	122.31	1.00	121.31	52.57
J-42		0.00	122.22	1.00	121.22	52.53
J-43		0.00	122.41	1.00	121.41	52.61
J-44		0.00	121.78	1.00	120.78	52.34
J-45		0.00	122.48	1.00	121.48	52.64
J-46		0.00	123.24	1.00	122.24	52.97
J-47		102.15	122.97	1.00	121.97	52.85
J-48		0.00	122.77	1.00	121.77	52.76
J-49		0.00	121.29	1.00	120.29	52.13
J-50		0.00	122.97	1.00	121.97	52.85
J-51		0.00	123.49	1.00	122.49	53.08
J-53		0.00	124.07	1.00	123.07	53.33
J-54		0.00	121.69	1.00	120.69	52.30
J-55		0.00	118.47	1.00	117.47	50.90
J-56		0.00	121.69	1.00	120.69	52.30
J-57		0.00	122.26	1.00	121.26	52.55
J-58		3.96	123.11	1.00	122.11	52.91
J-59		0.00	118.01	1.00	117.01	50.71
J-60		0.00	111.77	1.00	110.77	48.00
J-61		0.00	110.06	1.00	109.06	47.26
J-62		8.26	113.33	1.00	112.33	48.67
J-63		9.64	114.91	1.00	113.91	49.36
J-64		2.27	117.17	1.00	116.17	50.34
J-65		0.00	122.19	1.00	121.19	52.51
J-66		750.00	105.92	1.00	104.92	45.46
J-67		750.00	107.54	1.00	106.54	46.17
J-68		6.73	109.93	1.00	108.93	47.20
J-69		15.00	119.32	1.00	118.32	51.27
J-70		0.00	112.95	1.00	111.95	48.51
J-71		1.51	112.75	1.00	111.75	48.43
J-72		0.00	112.36	1.00	111.36	48.26
J-73		0.00	112.04	1.00	111.04	48.12
J-74		0.00	112.75	1.00	111.75	48.43
J-75		0.00	118.21	1.00	117.21	50.79
J-76		0.00	117.95	1.00	116.95	50.68
J-77		0.00	115.03	1.00	114.03	49.41
J-78		16.35	114.12	1.00	113.12	49.02
J-79		0.00	119.32	1.00	118.32	51.27
J-80		0.00	114.12	1.00	113.12	49.02
J-81		0.00	115.03	1.00	114.03	49.41
J-82		13.16	118.20	1.00	117.20	50.79
J-83		5.01	118.20	1.00	117.20	50.79
J-84		0.00	118.20	1.00	117.20	50.79
J-85		4.34	120.90	1.00	119.90	51.96
J-86		0.00	121.78	18.75	103.03	44.65
J-87		0.00	122.44	1.00	121.44	52.62
J-88	86	0.00	125.00	1.00	124.00	53.73
J-89		0.00	123.78	1.00	122.78	53.20
J-90		0.00	123.86	1.00	122.86	53.24

J-91	0.00	123.86	1.00	122.86	53.24
T-1	----	125.00	1.00	124.00	53.73
VP-1	----	130.57	1.00	129.57	56.14

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
T-1	789.03	
VP-1	1327.40	

NET SYSTEM INFLOW = 2116.43
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 2116.43

***** HYDRAULIC ANALYSIS COMPLETED *****

PLUMBING CALCULATIONS

Water Line Replacement, Hampton, VAMC

EXISTING CONDITIONS					NEW WORK		
Mark	**BUILDING FUNCTION**	Pipe Size (")	Pipe Material	Type of Isolation Valve	Water fixture units (wfu)	Misc Demand (gpm)	Total Demand (gpm)
6	QUARTERS				23.2	0.0	20.0
7,8,9,10,11	NEW ENGINEERING BUILDINGS				120.0	0.0	73.0
13	EXPAND WOMENS CLINIC				127.3	0.0	75.0
14	OEF / OIF CLINIC				59.3	8.0	62.0
15	BOILER PLANT				28.3	61.0	101.0
16	VACANT						-
17	CANTEEN				69.0	0.0	58.0
18	STORAGE	N/A	N/A	N/A			N/A
27	A & MMS WAREHOUSE / ENGINEERING ELEC SHOP	2 1/2"	Cu	Gate	102.8	43.0	111.0
28	ENGINEERING MECH SHOP	1 1/2"	Cu		42.9	0.0	48.0
31	ENGINEERING CARP SHOP	2"	Cu	Gate	41.0	23.0	71.0
33	NATIONAL LVA CHAPLAIN TRAINING CENTER	1 1/2"	Cu		18.8	0.0	34.0
35	POST OFFICE / ENGINEERING ADMIN OFFICES				36.0	0.0	46.0
36	FAC MGMT. SVC. / SECURITY / EMS				61.5	0.0	58.0
37	SAFETY OFFICE / GROUNDS AND TRANSPORTATION				66.4	0.0	56.0
43	IRM / UNION / SOCIAL WORKERS / HCMS				269.0	0.0	104.5
48	CHAPEL				49.3	0.0	50.0
50	VOLUNTARY SERVICE				133.3	0.0	77.0
52	SALVATION ARMY				244.5	0.0	101.0
61	VACANT						-
66	HRMS / HIMS / VRT / VOLUNTARY SERVICE				164.5	0.0	85.5
69	VACANT	Building no longer there					-
70	VACANT	Building no longer there					-
71	VIRGINIA EMPLOYMENT AGENCY	3" PVC, then turns into Copper			170.5	0.0	85.5
72	MEDICAL RESEARCH (VACANT)	Building no longer there					-
83	EDUCATION / TRAINING CENTER				62.4	5.0	63.0
95	PAINT STORAGE						-
100	GAS PUMP						-
107	QUARTERS LAUNDRY						-
108	INCINERATOR						-
110	HOSPITAL / OPC				1243.9	110.0	349.0

110A	CLINICAL ADDITION / LAUNDRY / SPD				267.0	58.0	161.0
110B	NEW AMBULATORY CARE FACILITY				1264.3	40.0	285.0
110C	MRI FACILITY				7.7	0.0	22.0
114	PALLIATIVE CARE	2"		Gate	203.6	0.0	91.0
115	VACO NATIONAL CHAPLAIN CENTER RESIDENCE				54.0	0.0	52.0
116	NUTRITION AND FOOD PRODUCTION SERVICES				258.5	23.0	127.5
124	GARAGE						-
125	CEMETERY						-
127	FLAGPOLE	N/A	N/A	N/A	N/A		-
129	ELECTRICAL STORAGE BUILDING						-
130	EMERGENCY GENERATOR (BLDGS 69/70/71 & 72)	**********Need to verify					?
131	STORAGE (CANTEEN SERVICE)						-
132	STORAGE						-
133	STORAGE						-
135	EXECUTIVE OFCS/BUSINESS FNC / MCCR / QA				128.3	0.0	77.0
137A	OUTPATIENT				73.3	0.0	61.2
137B	PSYCH WARD				371.4	0.0	127.0
137C	SCI				227.7	0.0	101.0
139	MAIN ELECTRICAL DISTRIBUTION BLDG (4160 V)						-
140	GAS METER	N/A	N/A	N/A	N/A		-
141	FUEL OIL TANKS	N/A	N/A	N/A	N/A		-
142	COOLING TOWER FOR BUILDING 135	1"		Gate	0.0	15.0	15.0
143	COOLING TOWER FOR BUILDING 137	**********Need to verify					?
146	120 BED EXTENDED CARE AND REHAB CENTER				677.2	0.0	177.0
147	COOLING TOWER FOR BUILDING 110A	See Building 142, There is only one cooling tower					
148A	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5
148B	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5
148C	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5
148D	DOMICILIARY CARE SERVICE (200 BED DOM)				214.3	0.0	95.5
148 S POD	DOMICILIARY CARE SERVICE (200 BED DOM)				73.3	0.0	61.2
148T	ELECTRICAL SUBSTATION				53.3	0.0	54.0
150	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
151	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
152	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
154	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
155	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
156	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-

158	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
159	ELECTRICAL SUBSTATION	N/A	N/A	N/A	N/A		-
160	SUN SHELTER	N/A	N/A	N/A	N/A		-
161	SUN SHELTER	N/A	N/A	N/A	N/A		-
162	SUN SHELTER	N/A	N/A	N/A	N/A		-
163	SUN SHELTER	N/A	N/A	N/A	N/A		-
164	SUN SHELTER	N/A	N/A	N/A	N/A		-
165	PICNIC SHELTER	N/A	N/A	N/A	N/A		-
167	EMGCY GENERATOR BLDG (SERVES BLDG 137)						-
168	TELECOMMUNICATIONS UNIT / DATA MGMT UNIT	**********Need to verify					?
169	WATER TOWER						
170	PICNIC SHELTER	N/A	N/A	N/A	N/A		-
171	EMERGENCY GENERATOR (110/110A/114)	N/A	N/A	N/A	N/A		-
172	OXYGEN STORAGE TANK	N/A	N/A	N/A	N/A		-
173	CWT BUILDING						-
173A	CWT PRODUCTION BUILDING				6.0	3.0	21.0
174	BOAT OWNER'S ASS. RESTROOM FACILITY	**********Need to verify					?
175	POLICE BOAT SHED						-
178	BASKETBALL COURT (SERVING BLDG 137)						-
179	HAZARDOUS MATERIAL STORAGE BUILDING						-
180	SMOKING SHELTER						-
181	SUN SHELTER						-
					7656.1	389.0	3543.4

BOWMAN, FOSTER & ASSOCIATES, P.C.
2424 26TH ROAD SOUTH
ARLINGTON, VA 22206
(703) 486-2780
FAX (703) 486-2781

JOB MISC (GPM)

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

ASSUMPTIONS

1 SHOWER - 20 gpm
1 EYEWASH - 3 gpm

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB WATER LINE PROJECTS (INPUTS)
SHEET NO. 1 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

BUILDING 36 (MARK HUDSON)

5 - (FT) WC (PUBLIC)
4 - LAV (PUBLIC)
2 - ELECTRIC WATER COOLERS
1 - MOP SINK

TOTAL FIXTURE UNITS = 61.5

DEMAND ROUND TO 70 wfu => 58 gpm

BUILDING 35 - (POLICE STATION)

2 - FV WC ✓
3 - LAV. (PUBLIC) ✓
2 - MOP SINK ✓
1 - SHOWER ✓

TOTAL FIXTURE UNITS - 36

DEMAND ROUND TO 40 wfu - 46 gpm

BUILDING 48 (CHAPEL)

2 - FV WC. ✓
3 - LAV (PUBLIC) ✓
1 - MOP SINK ✓
2 FT WC ✓
1 - EWC ✓

TOTAL FIXTURE UNITS - 49.25

DEMAND ROUND TO 50 wfu - 50 gpm

BUILDING 173 (CWT BUILDING)

2 - MOP SINKS
1 - EYEWASH 3 gpm MISC

NOTE - 3/4" WATER CONNECTION (NO RFP)

TOTAL FIXTURE UNITS - 6

DEMAND = 17.4 gpm + 3 = 20.4 gpm + 3 gpm

BUILDING 148T

4 - FV WC ✓
5 - LAV (PUBLIC) ✓
1 - MOP SINK ✓
1 - EWC ✓

TOTAL FIXTURE UNITS = 53.25

DEMAND ROUND TO 60 wfu = 54 gpm

BUILDING 146 (EXTENDED CARE AND REHAB)

FV WC (PRIVATE) - 57 ✓	342
FV WC (PUBLIC) - 14 ✓	140
LAV (PRIVATE) - 57 ✓	39.9
LAV (PUBLIC) - 22 ✓	44
SHOWER (PRIVATE) - 10 ✓	14
SHOWER (PUBLIC) - 6 ✓	24
MOP SINK - 6 ✓	18
BATH - 4 ✓	16
FV (URINAL) - 2 ✓	20
ICE MAKER - 2	0.5
CLOTHES WASHING MACH. (RESIDENTIAL) - 3	6
KITCHEN SINK - 3	12
EWC - 3	0.75

TOTAL FIXTURE UNITS - 677.15

DEMAND ROUND TO 750 wfu = 177.0 gpm

BUILDING 31 (CARPENTER SHOP)

DEMAND = 48 gpm + 23 gpm ROUND TO 45 wfu ≈ 71 gpm

FV WC - 2 ✓
EMERGENCY SHOWER/EYEWASH - 1
LAV (PUBLIC) - 2 ✓
MOP SINK - 1 ✓
FV (URINAL) - 1 ✓
SHOWER - 1 ✓

NOTE - 2" WATER LINE CURRENTLY

TOTAL FIXTURE UNITS - 41 + (23 gpm)

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB WATER LINE PROJECTS (INPUTS)

SHEET NO. 2 OF

CALCULATED BY DATE

CHECKED BY DATE

SCALE

BUILDING 15 (BOILER)

SHOWER - 1 ✓
FV WC - 1 ✓
FV URINAL - 1 ✓
LAV (PUBLIC) - 2 ✓
EWC - 1 ✓
EMERGENCY SHOWER/EYEWASH
BOILER FEED 3" LINE

DEMAND = ROUND TO 25 wfu
+ 46 + 15 gpm = 61
DEMAND 46 + 61 = 107 gpm
(STANDARD EYEWASH)
TOTAL
PEAK - 5000 gal / 8 hours = 10 gpm
BOILER FEED
ROUND TO 15 gpm
40 gpm
+23 gpm

TOTAL FIXTURE UNITS - 28.25 wfu + (23 gpm)

BUILDING 27 (NEED RICKS INFO)

(FIRST FLOOR)

FV WC (PUBLIC) - 4 ✓
FV (URINAL) - 1 ✓
LAV (PUBLIC) - 6 ✓
KITCHEN SINK - 2 ✓
FT WC (PUBLIC) - 1 ✓
COMBO EMERGENCY SHOWER/EYEWASH - 1
SHOWER (PUBLIC)

PARTIAL FIXTURE UNITS = 74.8 wfu
+ (23 gpm)

RICKY - 20 gpm
28 wfu

TOTAL wfu - 102.8 wfu
68 gpm (wfu) + 43 (MISC) = 111 gpm

BUILDING 17 (CANTINA)

(PUBLIC)

FT WC - 3 ✓
FV - URINAL - 1 ✓
LAV (PUBLIC) - 4 ✓
~~RESTAURANT~~ SINK - 4 ✓
MOP SINK - 1 ✓
ICE MACHINE - 1 ✓

DEMAND
ROUND TO 70 wfu
= 58 gpm

NOTE: 1½" BFP NOTED

TOTAL FIXTURE UNITS - 69

BUILDING 83 (TRAINING CENTER)

FV WC - 4 (PUBLIC) ✓
FV URINAL - 1 (PUBLIC) ✓
LAV (PUBLIC) - 4 ✓
KITCHEN SINK - 1 ✓
MOP SINK - 1 ✓
HOSE B±BB (5 gpm) - 1

DEMAND - ROUND TO
70 wfu = 58 gpm + 5 gpm
= 63 gpm

TOTAL FIXTURE UNITS - 62.4 wfu (+ 5 gpm)

BUILDING 66 (REGIONAL COUNSEL)

FV WC (PUBLIC) - 12 ✓
FV URINAL (PUBLIC) - 2 ✓
EWC - 2 ✓
LAV (PUBLIC) - 9 ✓
MOP SINK - 2 ✓

DEMAND ROUND TO 180 wfu
= 85.5 gpm

TOTAL FIXTURE UNITS - 164.5 wfu

BUILDING 43 (IRM BUILDING)

FV WC PUBLIC - 13 ✓
LAV PUBLIC - 27 ✓
EWC -
MOP SINK - 3 ✓
FV - URINALS - 6 ✓
SHOWER - 3 ✓
BATH - 1 ✓

DEMAND - ROUND TO 275 wfu
=> 104.5 gpm

TOTAL FIXTURE UNITS - 269 wfu

BUILDING 50 - RESIDENT ENGINEERS OFFICE

FV WC (PUBLIC) - 5 ✓
SHOWER - 3 ✓
BATH - 1 ✓
LAV (PUBLIC) - 12 ✓
FV (URINALS) - 3 ✓
FT WC (PUBLIC) - 1 ✓
MOP SINK - 1 ✓
EWC - 1 ✓

TOTAL FIXTURE UNIT - 133.25

DEMAND - ROUND TO
140 wfu = 77 gpm

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB
SHEET NO. 3 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

BUILDING 52 - SALVATION ARMY

FV WC (PUBLIC) - 11 ✓
FV URINAL (PUBLIC) - 6 ✓
LAV (PUBLIC) - 18 ✓ TOTAL FIXTURE
MOP SINK - 2 ✓ UNITS: 244.5
SHOWER - 8 ✓ wfus
EWC - 2 ✓ ROUND TO 250 DEMAND = 101 gpm

BUILDING 71 - VOCATIONAL SERVICE

FV WC (PUBLIC) - 12 ✓
LAV (PUBLIC) - 12 ✓
URINAL (PUBLIC) - 2 ✓
MOP SINK - 2 ✓
EWC - 2 ✓

NOTE: 3 = ISOLATION GATE VALVE (45° AFF)

TOTAL FIXTURE UNITS - 170.5
DEMAND = ROUND TO 180 wfus = 85.5 gpm wfu

BUILDING 110 - PARTIAL BASEMENT FLOOR PLAN

MOP SINK - III = (3) ✓
EMERGENCY SHOWER/EYEWASH - II = (2)
EWC - 1 = (1) ✓
LAV PUBLIC - ||| ||| ||| ||| ||| III = (28) ✓
SINK - II = (2) ✓
FV WC (PUBLIC) - ||| III = (8) ✓
SHOWER - 1 = (1) ✓
EYEWASH (ONLY) - II = (2)

PARTIAL FIXTURE UNITS: 157.25 wfu
+ 46 gpm

BUILDING 110 (CONT) FIRST FLOOR PARTIAL

LAV (PUBLIC) - ||| ||| ||| ||| |||| = (24) ✓
MOP SINK - II = (2) ✓
FV URINAL - (PUBLIC) - 1 = (1) ✓
FV WC (PUBLIC) - ||| = (5) ✓
EWC - 1 = (1) ✓
EYEWASH - 1 = (1)
SHOWER - 1 = (1) ✓

PARTIAL FIXTURE UNITS: 118.25 wfu + 3 gpm

BUILDING (110) (CONT) SECOND FLOOR PARTIAL

LAV (PUBLIC) - ||| ||| III = (13) ✓
MOP SINK
FV URINAL (PUBLIC) -
FV WC (PUBLIC) - II = (2) ✓
EWC - 1 = (1) ✓
EYEWASH - 1 = (1) ✓
SHOWER -

PARTIAL FIXTURE UNITS: 46.25 wfu
+ 3 gpm

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB WATER LINE PROJECTS (INPUTS)

SHEET NO. 4 OF

CALCULATED BY DATE

CHECKED BY DATE

SCALE

BUILDING (110) THIRD FLOOR - PARTIAL

LAV (PUBLIC) - 11 = (17) ✓
MOP SINK - 1 = (1) ✓
FV URINAL (PUBLIC) - 11 = (2) ✓
FV WC (PUBLIC) - 10 = (10) ✓
EWC - 1 = (1) ✓
EYEWASH - 11 = (2)
SHOWER - 11 = (2) ✓ 168.65 wfu + 6 gpm.
SINK - 1 = (1) ✓
ICE MAKER - 1 = (1) ✓

PRIVATE
FV WC (PRIVATE) - 11 = (12)
LAV (PRIVATE) - 11 = (12) } 97.2 wfu
SHOWER (PRIVATE) - 11 = (12)

PARTIAL FIXTURE UNITS = 265.85 wfu + 6 gpm

BUILDING (110) 5TH FLOOR - PARTIAL

LAV (PUBLIC) - 5 = (5) ✓
EWC - 2 = (2) ✓
MOP SINK - 1 = (1) ✓
FV (WC) PUBLIC - 4 = (4) ✓
PARTIAL FIXTURE UNITS = 53.5 wfu

BUILDING (110) 6TH FLOOR - PARTIAL

BUILDING 110 - FOURTH FLOOR - PARTIAL

LAV (PUBLIC) - 10 = (10) ✓
MOP SINK - 2 = (2) ✓
FV URINAL (PUBLIC) - 1 = (1) ✓
FV WC (PUBLIC) - 4 = (4) ✓
EWC - 2 = (2) ✓
EYEWASH - 2 = (2) ✓
SHOWER 79.9 wfu + 6 gpm
SINK - 2 = (2) ✓
ICE MAKER - 1 = (1) ✓

PRIVATE 145.8 wfu
FV WC (PRIVATE) - 18
LAV (PRIVATE) - 18
SHOWER (PRIVATE) - 18
= (18)

PARTIAL = 225.7 wfu + 6 gpm

BUILDING (110) - PENTHOUSE - PARTIAL

NO PLUMBING FIXTURES

BUILDING 110 SUBTOTAL

= 866.8 wfu AND 64 gpm (CHAD)
= 377.05 wfu AND 46 gpm (RICK)
1243.85 (wfu)
↓
239 gpm + 110 = 349 gpm

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB WATER LINE PROJECT (INPUTS)
SHEET NO. 5 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

BUILDING 110A (FIRST FLOOR)

LAV (PUBLIC) - 𝍸 𝍸 𝍸 I =16 ✓
MOP (SINK) - III =3 ✓
FV URINAL -
FV WC (PUBLIC) - 𝍸 =5 ✓
EWC - 1 =1 ✓
EYEWASH - 𝍸 I =6 ✓ MISC
SHOWER -
SINK - III =3 ✓
ICE MAKER - 1 =1 ✓
EMERGENCY SHOWER - II =2 ✓ MISC

PARTIAL FIXTURE UNITS - 99.25 wfus
+ 58 gpm

BUILDING 110A (THIRD FLOOR)

GET WITH RICK.

114.0 wsfu NO MISC

BUILDING 137A

LAV(PUBLIC) - 5 ✓
FV(WC)(PUBLIC) - 6 ✓
MOP SINK - 1 ✓
ELECTRIC WATER COOLER - 1 ✓

PARTIAL FIXTURE UNITS = 73.25 fu
DEMAND ROUND TO 80 fu = 61.2 gpm

BUILDING 110A (SECOND FLOOR)

GET WITH RICK

47.75 wfu NO MISC

TOTAL FOR 110A

MISC
267 wfu + 58 gpm

103 gpm + 58 gpm

= 161 gpm

BUILDING 110A (FOURTH FLOOR)

- 1" BFP LOCATED IN MECH. ROOM C408. OTHER THAN THAT, THERE WAS NO FIXTURES.

BUILDING 110A (PENTHOUSE FLOOR)

MOP SINK - 11
THIS ACCOUNTS FOR DEIONIZER BLD (3/4" VALVE) AND MOP SINK.

PARTIAL FIXTURE UNITS - 6 wfus

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB _____
SHEET NO. 6 OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

BUILDING 1108 (SECOND FLOOR)

LAV (PUBLIC) - 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 III = (58) ✓
MOP SINK - I = (1) ✓
FV URINAL (PUBLIC) - III = (3) ✓
EWC - I = (1) ✓
EYEWASH - III = (5) 9 gpm
SHOWER - II = (2) ✓
SINK - 𝍸 = (5) ✓
ICE MAKER - I = (1) ✓
FV WC (PUBLIC) - 𝍸 𝍸 𝍸 III = (18) ✓
HOSE BIBB - I = (1) 5 gpm
MOP SINK - I = (1) ✓

RICK
wsfu / MISC (gpm)
107.95 / 0 (gpm)

PARTIAL FIXTURE UNITS = 352.25 wfus
+ 14 gpm MISC

TOTAL FOR SECOND FLOOR
460.2 wfu + 14 gpm MISC

BUILDING 1108 (FIRST FLOOR) PARTIAL - GET W/ RICK

LAV (PUBLIC) - 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 IIII (34) ✓
MOP SINK - III = (3) ✓
FV (WC) (PUBLIC) - 𝍸 𝍸 𝍸 𝍸 III = (23) ✓
FV URINAL (PUBLIC) - 𝍸 𝍸 = (10) ✓
EWC - 𝍸 = (5) ✓
EYEWASH - I = (1) 3 MISC gpm
SHOWER - II = (2) ✓
SINK - I = (1) ✓
ICE MAKER - II = (2) ✓
HOSE BIBB

CHAD

RICK (INPUTS)
wsfu / MISC
381.8 / 23 gpm

PARTIAL FIXTURE UNITS : 422.25 wfu
+ 3 gpm

TOTAL FOR FIRST FLOOR
804.05 wfu + 26 gpm

TOTAL FOR BUILDING
1264.25 wfu
↓
245 gpm + 40 gpm = 285 gpm

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB
SHEET NO. 7 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

BUILDING 116

LAV (PUBLIC) - 11	= (17)	✓
FV WC (PUBLIC) - 1111	= (9)	✓
MOP SINK - 111	= (3)	✓
COMMERCIAL ICE DISPENSOR - 111	(3)	✓
RESTAURANT SINK - 11	= (17)	✓
FV URINALS (PUBLIC) - 1111	= (4)	✓
EWC - 11	= (2)	✓
DISHWASHER (COMMERCIAL) - 11	= (2)	* 20 gpm (SEE BELOW)
CLOTHES WASHER - 1	= (1)	✓
PRESSURE WASHER - 11	= (2)	✓
3/4" BFP - 1	= (1)	
EYEWASH - 1	= (1)	3 gpm

* BASED ON CHAMPION (106 PW) 356 RACK PER HOUR HIGH TEMP CONVEYOR DISHWASHER
(0.32 - 1.12 gal / RACK)

$$356 \frac{\text{RACKS}}{\text{HOUR}} \left| \frac{1.12}{\text{RACK}} \right| \frac{1 \text{ HOUR}}{60 \text{ MIN}} = 6.64 \text{ gpm} \Rightarrow \text{ROUND TO } 10 \text{ gpm PER DISHWASHER}$$

TOTAL FIXTURE UNITS - 258.5 ufu + 23 gpm misc

DEMAND - ROUND TO 275 ufus = (104.5 + 23) gpm = 127.5 gpm

BOWMAN, FOSTER & ASSOCIATES, P.C.
6379 Center Drive
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB
SHEET NO. 8 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

BUILDING 7, 8, 9, 10, 11

SHOWER - 4
FV WC - 8 PUBLIC
LAV (PUBLIC) - 8

TOTAL FIXTURE UNITS = 112 wfu

DEMAND ROUND TO 120 wfu = 73 gpm

BUILDING 6 (QUARTERS)

FT WC - 3 (PRIVATE)		6.6
LAVS (PRIVATE) - 4		2.8
SHOWER - 1		1.4
COMBO (SHOWER/TUB) - 1		4
KITCHEN SINK (PRIVATE) - 1		1.4
WASHER (RESIDENTIAL)	- 1	4
SERVICE SINK	- 1	3
		23.2 wfu

DEMAND - 20 gpm

BUILDING 37 (KATHY'S OFFICE)

FV WC (PUBLIC) - 5 x 10 =		50
LAVS (PUBLIC) - 6 x 2 =		12
KITCHEN SINK - 1 x 1.4 =		1.4
MOP SINK - 1 x 3 =		3
		66.4 wfu

DEMAND (gpm) = 56

BOWMAN, FOSTER & ASSOCIATES, P.C.
#4 Interstate Corporate Center, Suite 1
NORFOLK, VA 23502
(757) 466-7400
FAX (757) 466-7887

JOB WATERLINE REPAIR 11-ST

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

BLDG #		SFU	GPM (MISC)
135	GROUND	63.65	128.3
135	1ST FLR	64.65	DEMAND 140 wfu 77 gpm
137	- AREA C ✓	227.7	DEMAND 250 wfu - 101 gpm
137	- ~~AREA A~~ ✓ AREA B	371.4	DEMAND = 400 wfu = 127 gpm
[illegible]	3RD FLR	139.2	
[illegible]	2ND FLR	81.85	23 GPM
[illegible]	1ST FLR	79.05	377.05
[illegible]	6TH FLR	10.25	
[illegible]	BASEMENT	66.7	
148	A, B, C, D POD	214.3 x4	20 GPM
148	J POD	73.3	DEMAND (225 wfu) = 95.5 gpm
[illegible]	1ST	106.5	DEMAND (80 wfu) 61.2 gpm
[illegible]	2ND	28	
[illegible]	BASEMENT		20 GPM
[illegible]	1ST + 2ND	42.85	
[illegible]	1ST + 2ND	18.8	
[illegible]	2ND	97.1	203.6
[illegible]	BASEMENT, 1ST + 2ND	54	
[illegible]	3RD	114	161.75 wfu
[illegible]	2ND	47.75	
110B	2ND AREA 2C	7.25	
110B	GROUND - AREA GA	144.6	489.75 wfu
110B	GROUND - AREA GC	180	20 GPM
110B	GROUND - AREA GB	57.2	
110B	2ND AREA 2A	100.7	
110C	1ST	7.65	

(AREA A) 137