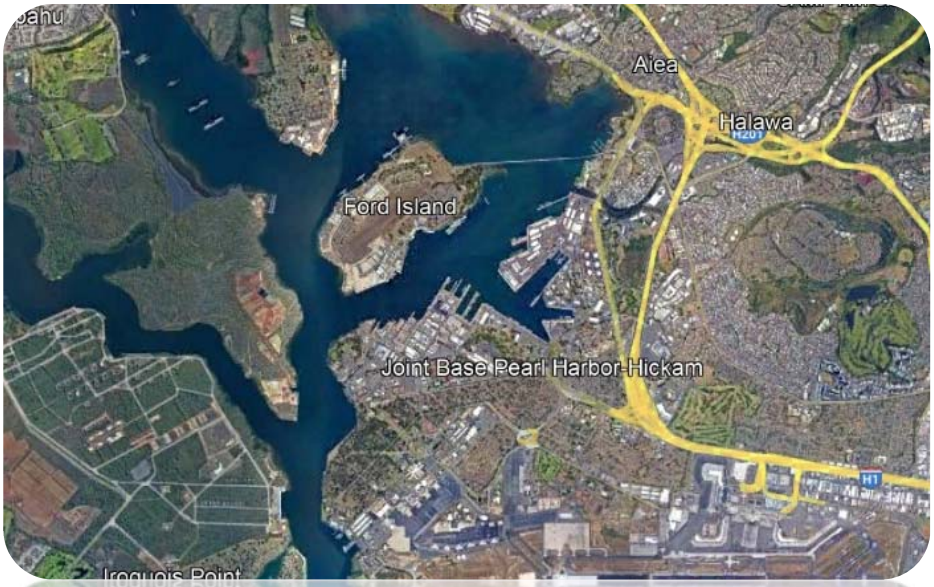
ENGINEERING CONSULTANTS

Final

UNIDIRECTIONAL FLUSHING PLAN FOR THE POTABLE WATER SYSTEM



JOINT BASE PEARL HARBOR-HICKAM, HAWAII

NAVFAC Naval Facilities Engineering Command NAVFAC WASHINGTON

CONTRACT: N62470-19-D-4001
DELIVERY ORDER: N6274224F0189

September 2025

FINAL REPORT FOR

UNIDIRECTIONAL FLUSHING PLAN AND MAINTENANCE FLUSHING PROGRAM FOR THE POTABLE WATER SYSTEM

JOINT BASE PEARL HARBOR-HICKAM, HAWAII

Prepared For:

NAVAL FACILITIES ENGINEERING COMMAND

Contract Number: N62470-19-D-4001
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September 2025

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ACRONYMS & ABBREVIATIONS

AH	AH/BC Navy JV, LLC
AMR	Aliamanu Military Reservation
APWO	Assistant Public Works Officer
AWWA	American Water Works Association
CFU	Colony Forming Units
DBMS	database management system
ft	feet
ft/s	feet per second
gpm	gallons per minute
JBPHH	Joint Base Pearl Harbor-Hickam
kg	kilogram(s)
kPa	kilopascal
KTR	housing contractor
L/s	liters per second
lb(s)	pound(s)
m/s	meters per second
mg/L	milligrams per liter
MGD	million gallons per day
mL	milliliter
mm	millimeter
NAVFAC	Naval Facilities Engineering Systems Command
NFPA	National Fire Protection Association
PRV	Pressure Relief Valve
psi	pounds per square inch
UDF	Unidirectional Flushing

1 INTRODUCTION

AH/BC Navy JV, LLC (AH) was tasked under Contract N62470-19-D-4001, Delivery Order N6274224F0189, to develop a Unidirectional Flushing (UDF) Plan for the Potable Water System at Joint Base Pearl Harbor-Hickam (JBPHH), Hawaii. AH received the JBPHH water distribution system map (Appendix A) from the geographic information system department and updated the map based on the site reconnaissance performed by AH personnel from September 23 through December 20, 2024.

1.1 PURPOSE

This document provides guidance in the development, implementation, and maintenance of a UDF Plan for JBPHH. Appendix B provides the step-by-step flushing procedures developed for JBPHH, including Hickam.

1.2 BACKGROUND

The distribution system is a key element of every public water supply. The importance of distribution systems is highlighted by the fact that 60 to 70 percent of the capital investment in a utility is generally allocated to the distribution of finished water. The distribution system also serves as the final barrier for protecting water quality prior to reaching the customer. Unfortunately, the traditional focus on hydraulic objectives may hinder the optimization of those required for maintaining high water quality. The last decade has brought an increasing awareness of the potentially deleterious effects that distribution systems can have on water quality.

A UDF plan is a powerful tool for maintaining water quality in the distribution system. Benefits of a UDF plan include reduced bacterial growth, restored disinfectant residual, color/turbidity control, corrosion control, and restored flow and pressures.

A UDF plan consists of systematically isolating a particular pipe section or loop, typically through closing appropriate valves, and exercising the hydrants in an organized,

sequential manner. UDF can be conducted locally in response to a specific water quality complaint or exercised as a preventive, system-wide effort. In the case of the JBPHH water distribution system flushing, a separate maintenance flushing program will be developed to provide the tools to conduct maintenance flushing on a yearly basis.

Low chlorine residuals and elevated microbiological levels are the primary water quality problems of a regulatory nature that flushing can correct. When sediment, loose biofilm, or other mobile obstructions cause increased hydraulic resistance in pipes, flushing can also improve hydraulic conditions (see Figure 1-1). In general, however, mechanical cleaning (pigging or swabbing) is better suited for restoring hydraulic performance.

Figure 1-1 Example of Debris Being Flushed Using UDF

2 PROGRAM DEVELOPMENT

AH completed a limited utility survey of the JBPHH water distribution system and updated the JBPHH water distribution system map (Appendix A) based on interviews with public works personnel, a field survey of hydrants, and a field survey of main system valves required to perform the UDF plan. The updated distribution system map was used to develop the UDF plan for the JBPHH water distribution system. AH developed the UDF plan by completing the following steps:

- Understand the JBPHH water distribution system
- Review the updated JBPHH water distribution system maps
- Determine system loops
- Determine flushing velocities
- Develop flushing procedures

2.1 UNDERSTAND JBPHH WATER DISTRIBUTION SYSTEM

This section describes the installation's water production, storage, and distribution system. Figure 2-1 provides a system schematic. Raw water originates from three shafts drilled horizontally into the volcanic rock, skimming water from the top of the fresh water lens. The western-most shaft, Waiawa, produces up to (b) (3) (B) per day (MGD) using (b) (3) (B) pumps. (b) (3) (B) are rated (b) (3) (B) gallons per minute (gpm) (b) (3) (B) and (b) (3) (B) are rated (b) (3) (B). The Red Hill Shaft is located furthest east of the three sources, and historically produces approximately (b) (3) (B), with (b) (3) (B) pumps. (b) (3) (B) pumps are rated (b) (3) (B) gpm (b) (3) (B), and (b) (3) (B) rated (b) (3) (B) gpm (b) (3) (B). The Aiea-Halawa Shaft is located west of Red Hill and produces approximately (b) MGD with (b) (3) (B) gpm (b) (3) (B) pumps (b) (3) (B) The (b) (3) (B) pump is currently undergoing repair. The Aiea-Halawa and Red Hill shafts have been out of operation since the Red Hill fuel spill incident in November 2021.

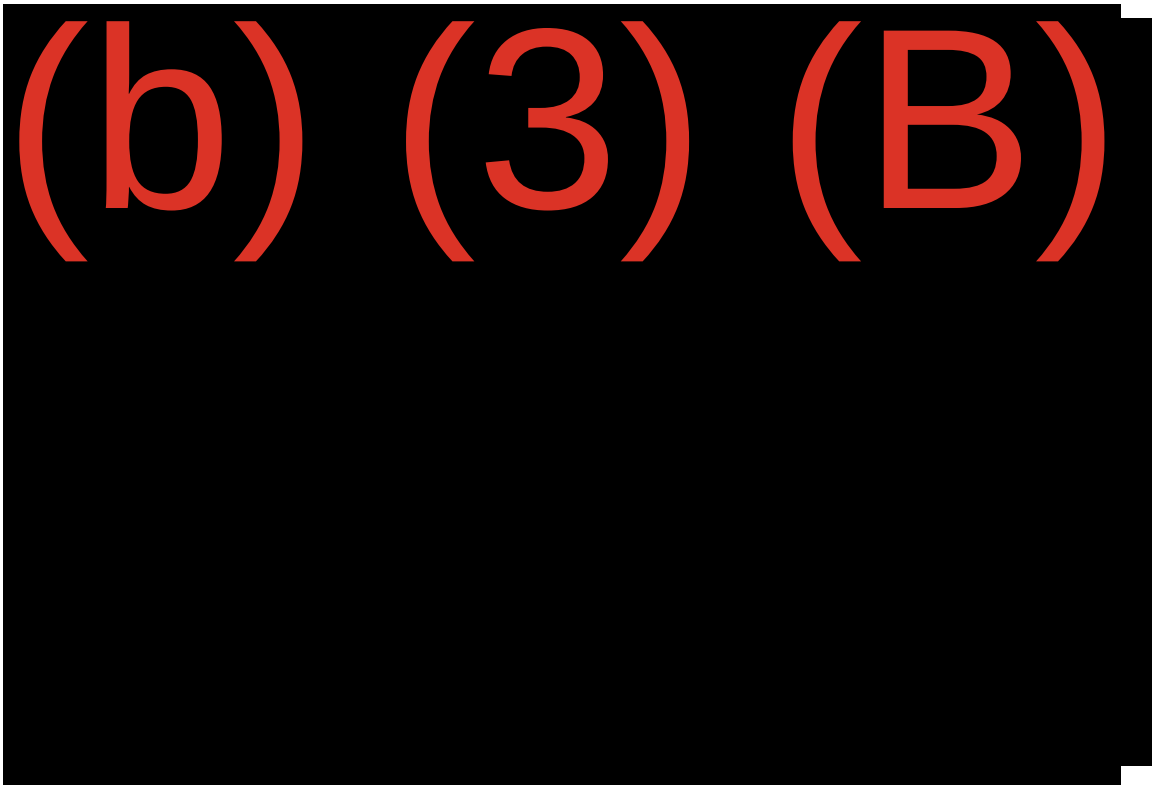


Figure 2-1 JBPHH System Schematic

After chlorine and fluoride have been added at the sources, water flows into a distribution system comprising over 250 miles of mains ranging from 4 to 42 inches in diameter and made from the following materials (in order of decreasing total length): cast iron, polyvinyl chloride, ductile iron, asbestos-cement (Transite), and high-density polyethylene. The lining materials, if any, for the cast iron pipes are not known. The ductile iron pipes are likely cement-lined. Most of the Navy water system is within one pressure zone, ranging in elevation from near sea level to approximately 100 feet (ft). Storage in the main pressure zone includes two (b) (3) (B) ground storage reservoirs, Halawa Tanks S1 and S2. Tank S2 is currently undergoing re-construction.

Areas of the Navy system above 100 ft elevation are supplied by booster pump systems. These include the Moanalua Terrace Housing Area, the Marine Corps Housing Area at Manana, the Marine Corps Base Hawaii at Camp Smith (at over 600 ft elevation), and two water storage tanks at Red Hill (at over 550 ft elevation). Moanalua

Terrace Housing receives water through t(b) (3) (B) [redacted]. The Manana booster pump station has t(b) (3) (B) [redacted]. Camp Smith is supplied by (b) (3) (B) [redacted]. Water storage at Camp Smith includes one (b) (3) (B) [redacted] (Tank 327) and two (b) (3) (B) [redacted] (Tanks 325 and 326) ground storage tanks at elevation 850 ft. Tank 325 is currently undergoing project for replacement which will increase the new tank size. Camp Smith spans an elevation range of nearly 400 ft; thus, there are several automatic control valves limiting the pressure to approximately (b) (3) (B) [redacted] per square inch (psi) at the furthest downhill locations.

At the Red Hill Shaft, there are (b) (3) (B) [redacted] pumps that supply water to (b) (3) (B) [redacted] (Tanks 316 and 685). The Navy also serves a consecutive water system owned by the Army through two inter-connections: one serving the Red Hill housing area and one serving the Aliamanu Military Reservation (AMR), comprised of Army housing within the Aliamanu Crater and the former Coast Guard Reservation. The Red Hill Housing area receives water from Navy Tanks 316 and 685. AMR is supplied through a metered connection (b) (3) (B) [redacted].

2.2 REVIEW WATER DISTRIBUTION SYSTEM MAPS

AH reviewed the available JBPHH water distribution system maps, updated maps created following the distribution system evaluation, and valve exercise program to gain an understanding of normal water flow paths/directions in the distribution system under average-day conditions. The UDF plan for the water distribution system at JBPHH Pearl Harbor will follow the path shown in Figure 2-2, while the water distribution system at JBPHH Hickam will follow the path shown in Figure 2-3. The UDF plan was designed to minimize daily water use to ensure adequate storage and pressure remain in the system. During normal operation, the area system distribution pumps and elevated tank maintain the potable water distribution system pressure at approximately (b) (3) (B) [redacted]

kilopascal (kPa) or (b) (3) (B). This pressure is sufficient for conducting UDF as long as the system pressure stays above (b) (3) (B) psi during flushing.

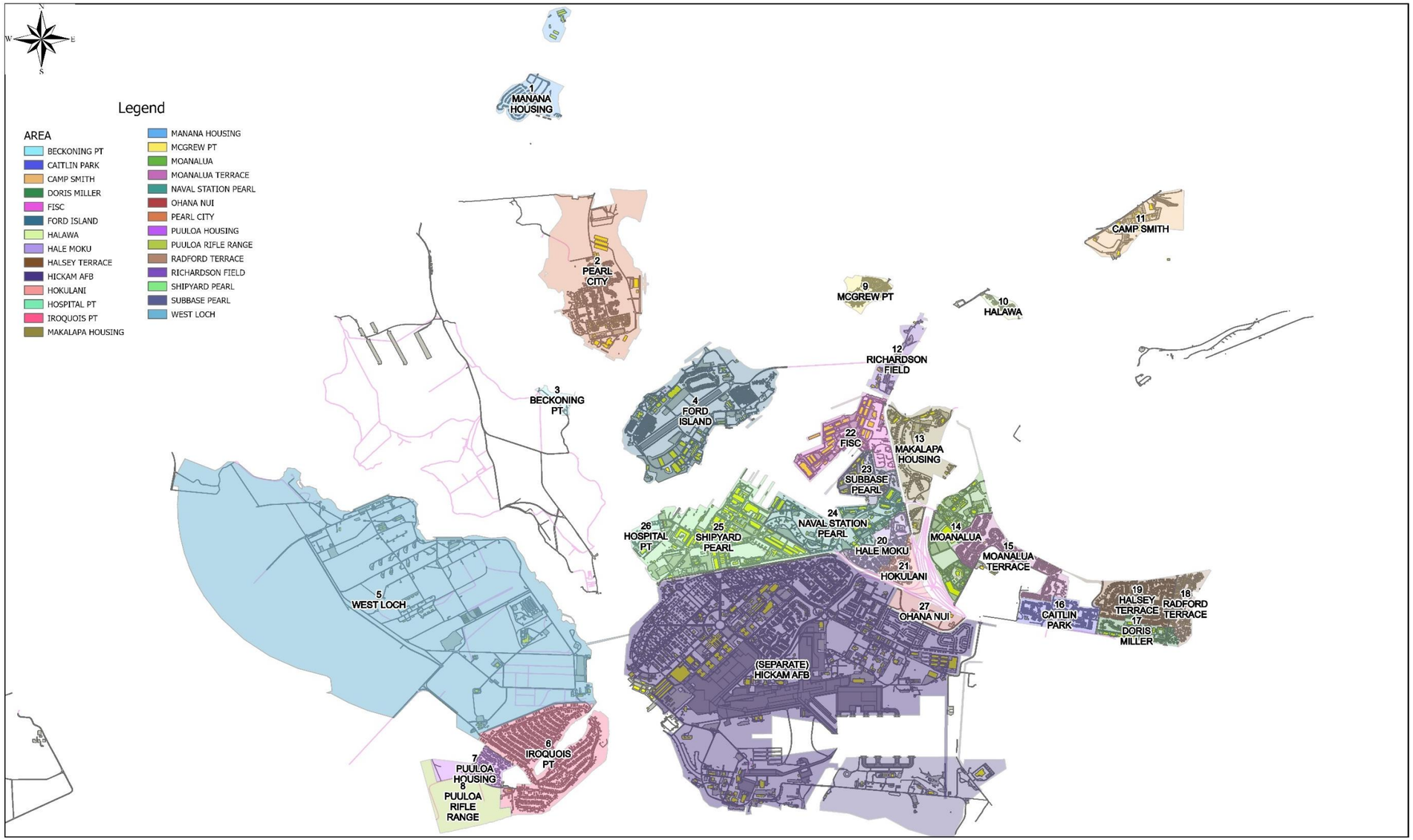


Figure 2-2 JBPHH Pearl Harbor Areas Flushing Sequence

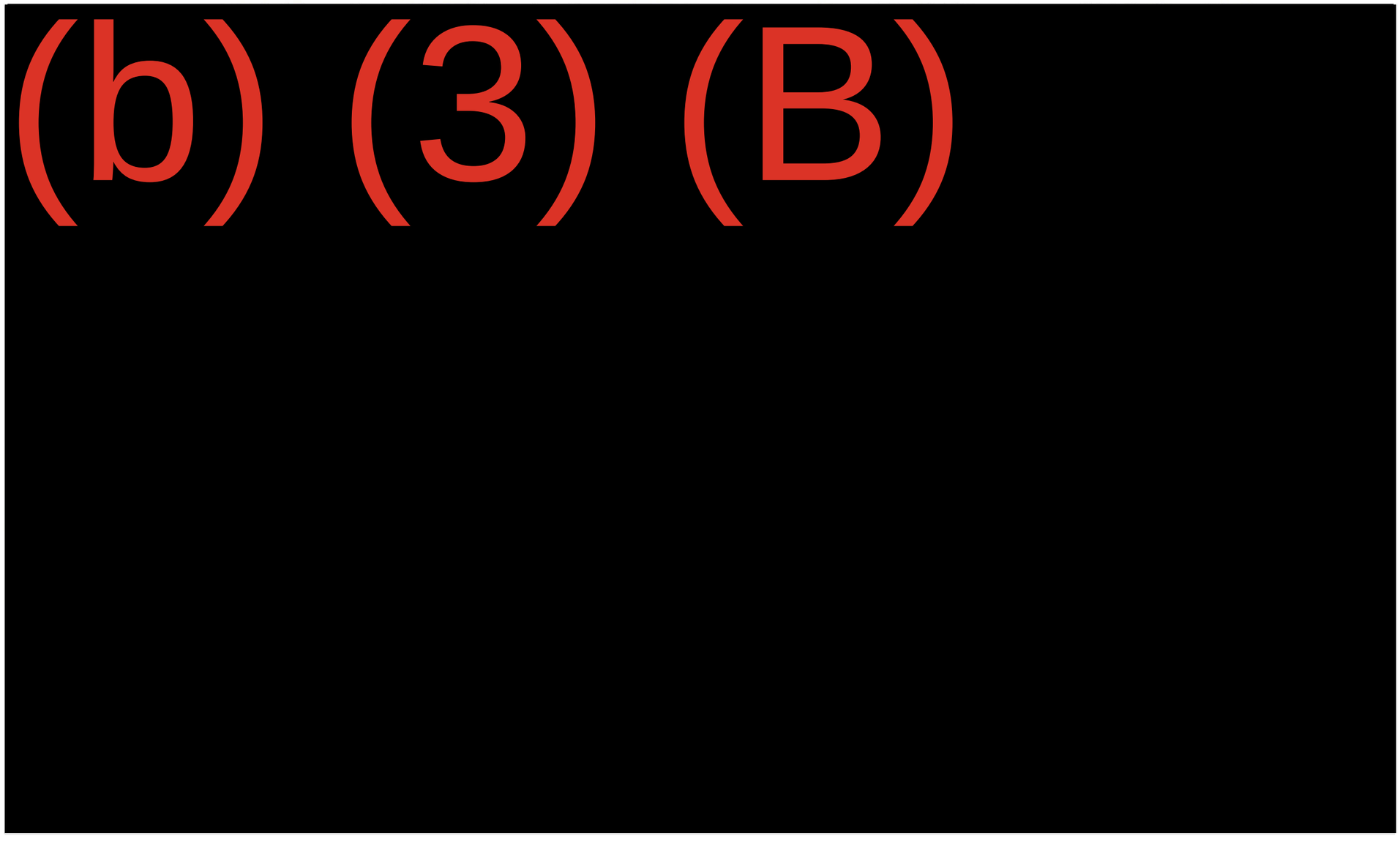


Figure 2-3 JBPHH Hickam Zones Flushing Sequence

2.2.1 Pearl Harbor Areas Flushing Sequence

The water distribution UDF sequence for Pearl Harbor relies on the water from the main pump station at Waiawa as the starting point for the UDF plan. Naval Facilities Engineering Systems Command (NAVFAC) Hawaii, AH, and EPA agreed on a UDF plan that will not include water distribution main lines greater than 12 inches in size due to unavailable hydrants and the amount of water needed to flush these lines. The assumption for the Pearl Harbor flushing plan is that all transmission lines greater than 12 inches are clean and will serve as main sources for the flushing plan. The flushing sequence was assigned to move water from the main pump station at Waiawa to the distribution system peripheries and should follow the order presented in Table 2-1.

Table 2-1 Pearl Harbor Area Flushing Sequence

Area	Sequence Number	Area	Sequence Number
Manana Housing	1	Moanalua Terrace	15
Pearl City	2	Caitlin Park	16
Beckoning Point	3	Doris Miller	17
Ford Island	4	Radford Terrace	18
West Loch	5	Halsey Terrace	19
Iroquois Point	6	Hale Moku	20
Puuloa Housing	7	Hokulani	21
Puuloa Rifle Range	8	FISC	22
McGrew Point	9	Subbase Pearl	23
Halawa	10	Naval Station Pearl	24
Camp Smith	11	Shipyard Pearl	25
Richardson Field	12	Hospital Point	26
Makalapa Housing	13	Ohana Nui	27
Moanalua	14		

2.2.2 Hickam Zones Flushing Sequence

The water distribution UDF sequence for Hickam relies on the water distribution main lines greater than 12 inches in size as the starting point for the flushing plan. NAVFAC Hawaii, AH, and EPA agreed on a UDF plan that will not include water distribution main lines greater than 12 inches in size due to unavailable hydrants and the amount of water needed to flush these lines. The assumption for the Hickam UDF plan is that all transmission lines greater than 12 inches are clean and will serve as main sources for the flushing plan. The flushing sequence was assigned to move water from the large main lines to the distribution system peripheries and should follow the order presented in Table 2-2.

Table 2-2 Hickam Zone Flushing Sequence

Area	Sequence Number
Zone 4	1
Zone 5	2
Zone 6	3
Zone 7	4
Zone 8	5
Zone 2	6
Zone 1	7
Zone 12	8
Zone 9	9
Zone 3	10
Zone 10	11
Zone 11	12

2.3 DETERMINE SYSTEM LOOPS

The next task was to delineate the distribution system into individual loops (Appendix B). Loops are sections within the distribution system, starting at the water source(s) and ending at the system's periphery, that are to be flushed in sequence. Each loop consists of a manageable section, sized with consideration of flushing crew size, duration of flushing, equipment availability, and location of water sources (such as main

pump station), storage tanks, and booster stations. The distribution system was delineated with the goal of completely flushing each individual loop within the crew's work shift. This allows for reopening of all valves used to isolate a loop during the flushing and avoids keeping normally open valves closed for an extended duration. For JBPHH, the flushing loops were developed for a flushing crew size of two people to accomplish each flushing loop in a single day. The total number of loops for Pearl Harbor flushing areas is 119 loops while the total number of loops for the Hickam flushing zones is 63 loops, for an overall total of 182 loops to flush the entire JBPHH area. The 182 loops require a minimum of 182 working days for a 2-person flushing crew to accomplish.

2.4 DETERMINE FLUSHING VELOCITIES

After delineating the loop, AH evaluated the flushing velocities. Industry standard indicates that 1.8 meters per second (m/s) (6 feet per second [ft/s]) is the minimum velocity required to dislodge biofilm from pipe walls. According to UFC 3-230-02 section 6-3.3.2 Flushing Procedure "A velocity of 6 feet per second (fps) (1.8 meters per second [mps]) is recommended for flushing." In addition, American Water Works Association (AWWA) M68 Water Quality in Distribution Systems manual states, "However, to promote scouring and remove biofilm and loose deposits, velocities 5 to 6 fps are desired in UDF." This flushing velocity might not be attainable in some systems due to low system pressure or flow unless temporary adjustments to the system are made like running fire pump to boost system pressure or adding additional booster pumps. In case the pressure and flow could not be attained, the pipe segment can be cleaned by mechanical means (like ice pig, foam pig, or standard cleaning pig) at a later date. The flow rates required to obtain velocities greater than 1.8 m/s (6 ft/s) can be determined from fluid flow equations as shown in section 3. Flushing velocities should be calculated during flushing based on residual pressure and water flow. Table 2-3 was developed to assist in determining the number of 64-millimeter (mm) (2 ½-inch) hydrant outlets that must be opened to provide a minimum velocity of 1.8 m/s (6 ft/s) at a hydrant outlet pressure of (b) (3) (B) [redacted]. Hydrant openings were assumed to be smooth and rounded (refer to Section 3.2).

Table 2-3 Flow Rate Requirements

(b) (3) (B)

The velocities for the JBPHH flushing plans were calculated for each step of the loop based on the JBPHH Water Hydraulic Model developed by AH in 2021. The static pressures listed in Table 2-4 were assumed for each area.

(b) (3) (B) area static pressure and water flow is normally too low for UDF flushing operations when only the booster pump station is in operation. For (b) (3) (B), the fire pumps will be used to increase the pressure in the water distribution system to approximately (b) (3) (B) during the flushing operation. The fire pumps will be turned off after the flushing operation and the booster pumps will be turned back on.

(b) (3) (B) area static pressure is normally too low for water distribution. The area utilizes booster pumps and (b) (3) (B) to keep the pressure in the housing area elevated. Figure 2-4 shows the location of the (b) (3) (B) and booster pumps throughout the (b) (3) (B) area water distribution system while Figure 2-5 shows one of the check valves with an arrow showing the direction of water flow. The static pressure assigned to (b) (3) (B) is (b) (3) (B) when one or both booster pumps are operational.

For both (b) (3) (B) water distribution system, AH recommend the use of pressure relief valve (PRV) at the lowest elevation in the system to relieve the pressure while the flushing operation is ongoing. (b) (3) (B)

The information entered into the Excel flushing log to calculate the velocity for each step is based on the following:

- Static pressure for each area was selected from Table 2-4
- Pitot (discharge) pressure for each area was calculated from static pressure minus 5 psi of pressure drop
- Hydrant Coefficient of 0.85

Table 2-4 JBPHH Assumed Pressures by Area or Zone

Area/Zone	Pressure (psi)	Area/Zone	Pressure (psi)
Manana Housing	(b) (3) (B)		
Pearl City			
Beckoning Point			
Ford Island			
West Loch			
Iroquois Point			
Puuloa Housing			
Puuloa Rifle Range			
McGrew Point			
Halawa			
Camp Smith			
Richardson Field			
Makalapa Housing			
Moanalua			
Moanalua Terrace			
Caitlin Park			
Doris Miller			
Radford Terrace			
Halsey Terrace			
Hale Moku			

Using the equations in Section 3.2.3, the velocities were calculated and integrated into the step-by-step flushing loops. These velocities provide the approximate value that should be attained and should not be used as a firm value of the final velocity. To

determine the exact velocity, the flushing crew must calculate the field velocity from the pitot reading and the discharge rate.

The Excel spreadsheet included in Appendix C will help the crew determine the flow velocity in the pipe by inputting the field readings into the spreadsheet. The spreadsheet will provide the exact velocity once the crew enters all required values.

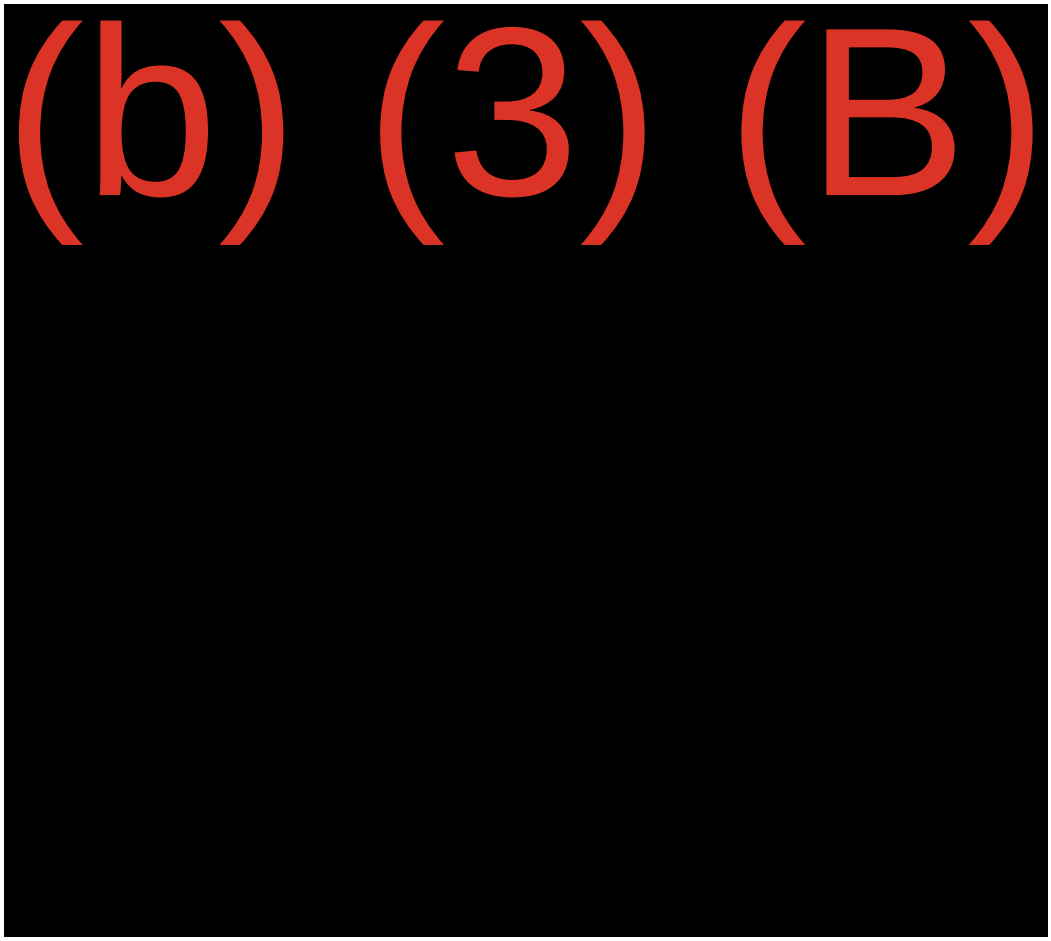


Figure 2-5 (b) (3) (B) Check Valve

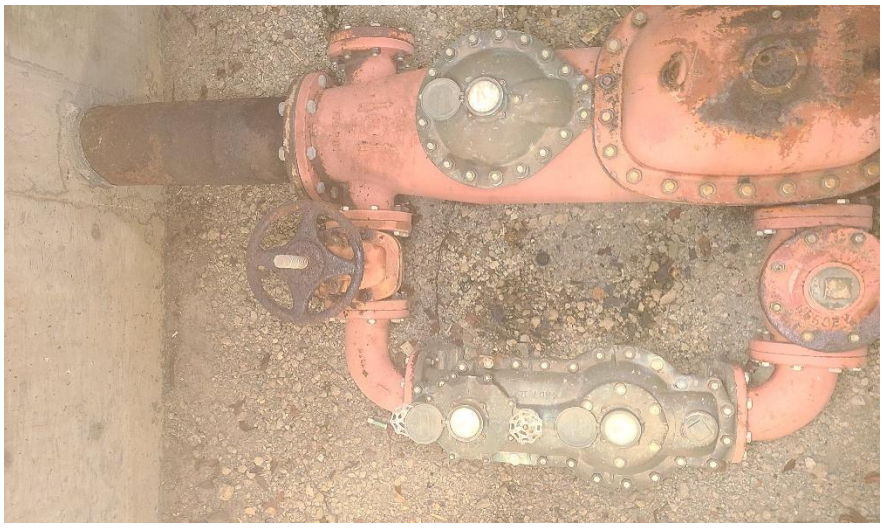
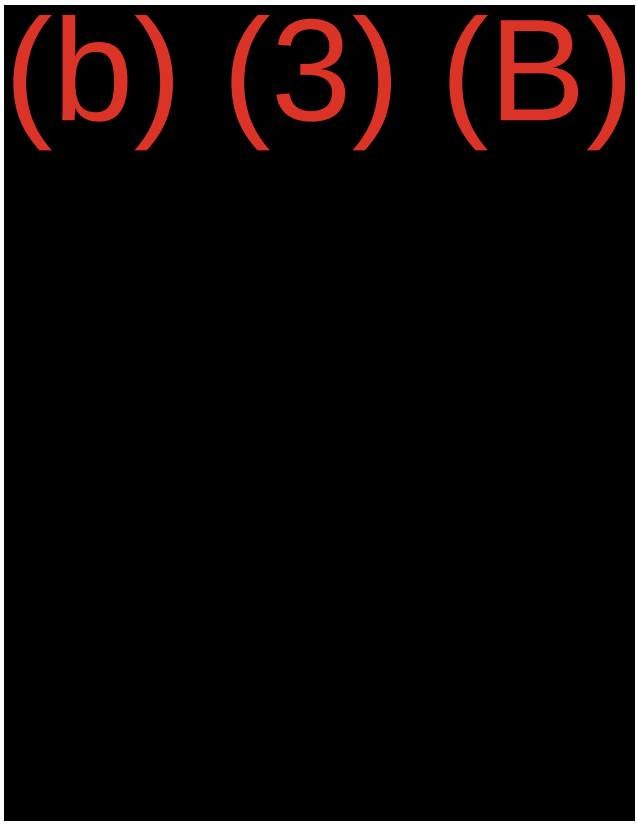
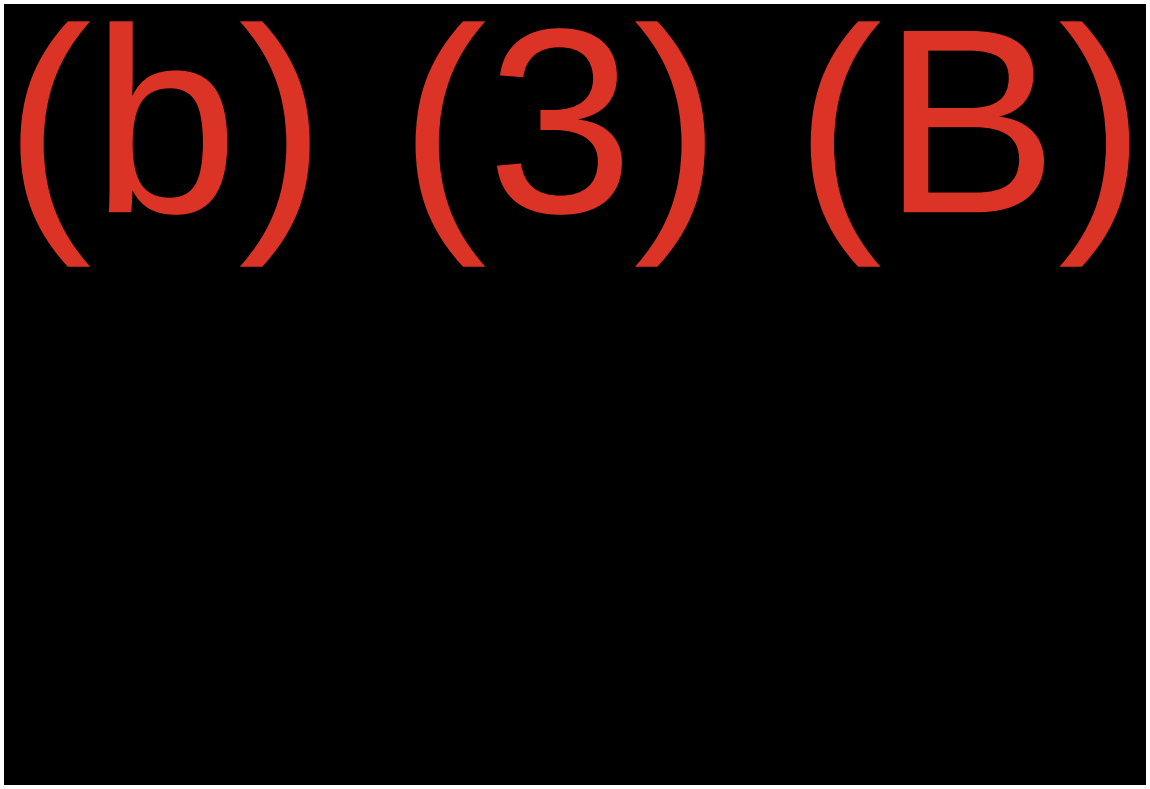


Figure 2-6 (b) (3) (B) Selected PRV Location





2.5 DEVELOP FLUSHING PROCEDURES

The final task for developing the JBPHH UDF plan included the preparation of step-by-step flushing procedures (Appendix B). These procedures provide precise instructions with regard to the sequence of valve and hydrant opening and closing. Each step includes an individual colorized map. The maps show the valve and hydrant status (open or closed) during each step of the flushing procedure. A two-man crew should be able to perform each JBPHH flushing loop in a single day. In addition to the colored maps, the Excel spreadsheet includes a field for each step with pre-entered values that include the assumed static and residual pressures, the measured length of the main water line being flushed, and the minimum time it takes to flush five times the water line volume. During the flushing field work, the crew needs to adjust the pre-entered values to reflect the measured values during the UDF plan flushing step.

2.6 FLUSHING OPERATION WATER USAGE

After finishing the steps in determining the system loops, determining the system velocities, and developing the flushing loops, the final task is to figure out the amount of water used during the flushing operation. This task is estimated by entering all the needed parameters into the flushing log Excel sheet. The built-in formulas will calculate the amount of water used to clean the pipe for each and every step for each developed loop. All the values are estimates and will be modified during flushing operations by entering the field values for static and residual pressures, in addition to pitot pressure and time the hydrant was opened.

The estimated water usage for Pearl Harbor flushing is shown in Table 2-5 while the Hickam flushing water usage is shown in Table 2-6.

Table 2-5 Estimated Water Usage for Pearl Harbor Flushing Operation

Area/Zone	Water Usage (Gallons)	Area/Zone	Water Usage (Gallons)
Manana Housing	(b) (3) (B)	Moanalua Terrace	(b) (3) (B)
Pearl City		Caitlin Park	
Beckoning Point		Doris Miller	
Ford Island		Radford Terrace	
West Loch		Halsey Terrace	
Iroquois Point		Hale Moku	
Puuloa Housing		Hokulani	
Puuloa Rifle Range		FISC	
McGrew Point		Subbase Pearl	
Halawa		Naval Station Pearl	
Camp Smith		Shipyard Pearl	
Richardson Field		Hospital Point	
Makalapa Housing		Ohana Nui	
Moanalua			
Total Water Usage for Pearl Harbor Water Distribution System			(b) (3) (B)

Table 2-6 Estimated Water Usage for Hickam Flushing Operation

Area/Zone	Water Usage (Gallons)
Hickam Zone 4	(b) (3) (B)
Hickam Zone 5	
Hickam Zone 6	
Hickam Zone 7	
Hickam Zone 8	
Hickam Zone 2	
Hickam Zone 1	
Hickam Zone 12	
Hickam Zone 9	
Hickam Zone 3	
Hickam Zone 10	
Hickam Zone 11	
Total Water Usage for Hickam Water Distribution System	

The estimated amount of water used for Pearl Harbor distribution system UDF plan flushing operation is (b) (3) (B) while the estimated amount of water used for Hickam distribution system UDF plan flushing operation is (b) (3) (B). The total water usage for both UDF flushing operations is estimated to be (b) (3) (B), or around (b) (3) (B). The breakdown for each area's water usage is shown in Appendix C.

3 PROGRAM IMPLEMENTATION

3.1 KEY CRITERIA

An effective UDF plan requires not only good design, but proper execution. The list below includes key criteria for a successful flushing program:

- Flush the system from the water source to the system's periphery.
- Flush from larger mains to smaller mains.
- Maintain flushing velocities of 1.8 m/s (6.0 ft/s) or greater and a residual pressure of at least (b) (3) (B) psi).
- Exercise valves and hydrants prior to flushing (as part of a vigorous maintenance program) to minimize interruptions during flushing. Refer to Section 3.3.4 of this manual for additional information on a valve and hydrant maintenance program.
- Properly train and equip flushing crews.
- Maintain a confined space entry program and train crews on proper entry procedures, if needed.
- Conduct water quality monitoring before, during, and after flushing to assure effectiveness. For example, flushing may stop when the turbidity decreases below one (1) Nephelometric Turbidity Unit.
- To minimize impacts to distribution water pressures, coordinate flushing with Waiawa production operators to ensure storage and production rates are at their maximum levels.
- Conduct flushing in accordance with the Hawaii Department of Health Storm Water Discharge Permit.
- Perform public notification before and during the flushing program. Refer to Section 5 for notification details.

3.2 FLOW TESTING

Flow testing during the flushing process is imperative to ensure flushing velocities exceed 1.8 m/s (6 ft/s). Flushing crews can use a pitot gauge at the flowing hydrant to determine the flushing discharge in the field. A pitot gauge is a hand-held instrument used to measure the amount of flow from a fire hydrant. It consists of a knife-like device

furnished with an orifice at its end and a pressure gauge. The pitot gauge manufacturer provides a set of tables to convert the pressure reading on the gauge to flow rate. Figure 3-1 and Figure 3--2 show a hand-held pitot gauge and a diffuser with a built-in pitot gauge, respectively.

Figure 3-1 Hand-held Pitot Gauge

Figure 3-2 Diffuser with a Built-in Pitot Gauge

To minimize problems associated with backflow and back-siphonage, the crew should use a pressure gauge to monitor static pressure at a location downstream of the flowing hydrant. The residual pressure should not decrease below (b) (3) (B) Figure 3-3 illustrates the proper location of pressure and pitot gauges.

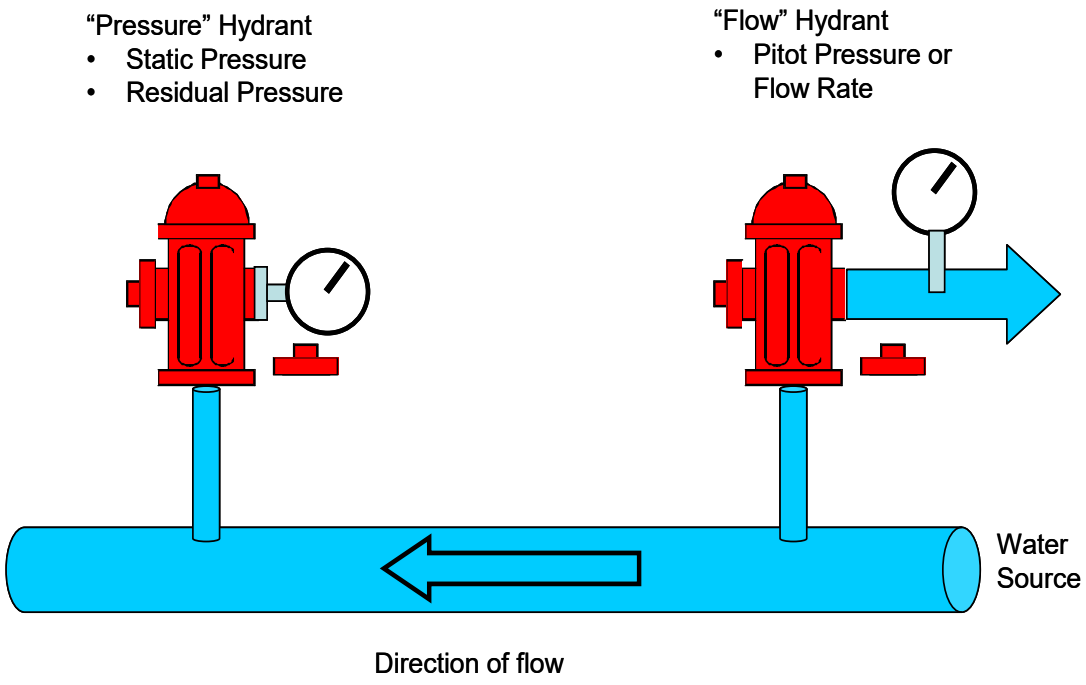


Figure 3-3 Pressure Gauge and Pitot Gauge Placement

3.2.1 Determining the Flow Rate

The pressure measured by the pitot gauge, *P* (kPa), is related to the flushing discharge, *Q* (L/s), through the following equation in metric units:

[redacted]

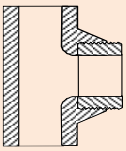
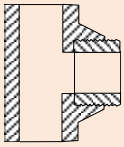
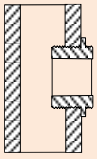
D is the diameter of the hydrant orifice in mm and C_D is the *coefficient of discharge* or *hydrant coefficient*.

The following equation defines the relationship between pressure and discharge measured in English units (*P* in psi, *D* in inches, and *Q* in gpm):

[redacted]

The hydrant coefficient, C_D, is an empirically determined value that accounts for the head loss and the contraction of the flow stream at the opening. Hydrant coefficients vary depending on the manufacturer and are usually a function of the shape and size of the opening to the circular orifice. Table 3-1 illustrates the three most common types of openings on 2½-inch hydrant orifices.

Table 3-1 Discharge Coefficients

Shape		Coefficient of Discharge C_D
Smooth and Rounded		0.90
Square and Sharp		0.80
Square and Projecting		0.70

3.2.2 Determining the Flushing Velocity

Once the flushing discharge, Q (L/s), has been determined, the velocity inside the water main, v (m/s) can be calculated using the following equation in metric units:

In this equation, D refers to the pipe diameter (mm), not the orifice diameter.

In English units the velocity, *v*, is expressed in ft/s, *Q* in gpm, and *D* in inches. The equation is then written as follows:

[redacted]

3.2.3 Example

Consider a section of 200-mm (8-in) diameter water main. A pressure hydrant and a flow hydrant have been identified, and one 64-mm (2½-in) outlet on the flow hydrant has been opened. The shape of the outlet is smooth and rounded but most hydrant manufacturers specify a discharge coefficient of 0.85. Therefore, a discharge coefficient, C_D, of 0.85 is used. A pitot gauge provides a reading of 414 kPa (60 psi). Using the above equations, the flushing discharge in metric units equates to the following:

[redacted]

The flushing velocity inside the 200-mm (8-in) pipe is calculated as follows:

[redacted]

For the same example using English units, flow rate and flushing velocity are computed as follows:

[redacted]

This flushing exercise achieves a velocity greater than 1.8 m/s (6 ft/s) and should provide good biofilm removal in the pipe.

3.2.4 Hydrant Flow Capacity

In some cases, a utility may want to determine the *residual flow* of a hydrant or *hydrant capacity* during the execution of a flushing program. The residual flow is an important measure of the ability of a water distribution system to deliver an adequate water supply in the event of a fire. The residual flow is the maximum flow rate the system can sustain while maintaining a minimum static pressure of (b) (3) (B) to prevent backflow or back-siphonage.

The residual flow, Q_R, can be determined from the hydrant flow rate, Q_F, measured during flushing and the static pressure downstream of the flowing hydrant. In the context of fire flow testing, the static pressure before opening the hydrant is represented as P_S. The static pressure measured after opening the hydrant is referred to as the *residual pressure*, P_R. In metric units, the residual flow Q_R (L/s) at a residual pressure of 140 kPa can be calculated using the following empirical equation:

Similarly, in English units, the residual flow Q_R (gpm) at a residual pressure of 20 psi can be calculated as follows:

The example presented in Section 3.2.3 determined a hydrant discharge of 79 L/s (1227 gpm). Assuming static and residual pressures (P_S and P_R) of 520 kPa (75 psi) and 414 kPa (60 psi), respectively, the residual flow, Q_R, can be calculated in metric units as follows:

Similarly, in English units:

It is important to note that hydrant capacities calculated from flow testing during UDF may be overestimated if valve isolation is used to maximize the flushing velocities. Where a reliable estimate of the flow capacity is obtained, hydrants may be color-coded according to the guidelines of the National Fire Protection Association (NFPA) as shown in Table 3-2.

Table 3-2 NFPA Color Coding Guidelines

Flow Capacity at a Residual Pressure of 140 kPa (20 psi)		Color Code
L/s	gpm	
0 – 31	0 – 499	Red
31 – 63	500 – 999	Orange
greater than 63	greater than 1000	Green

3.3 PROGRAM REFINEMENT

3.3.1 Preparations

Prior to full-scale flushing, system personnel should conduct a records review and several inspections and tests:

- Review the spacing and location of fire hydrants. The major purpose of fire hydrants is to protect public life and property in the event of a fire. Hydrants should be spaced so that hose lines are no longer than 500 to 600 feet. Hydrants should be located at street intersections where they are accessible from all four directions.
- Conduct test flushing of a few selected areas with the worst known pipe condition within the distribution system to determine the nature and extent of probable complications. In addition to the flushing crew, place a well-equipped maintenance crew and valve crew on standby at the site to immediately address leaks, hydrant malfunctions, or service disruptions. These crews should have copies of the hydrant and valve inspection reports for reference.
- Review leak and corrosion records for the area to anticipate structural weaknesses in the piping. This will also aid in assessing the extent of maintenance crew to place on standby.

3.3.2 Hydrant and Valve Operation

When opening a hydrant, count the number of wrench turns required to fully open the hydrant. When closing, count the number of wrench turns to ensure the hydrant is fully closed. Often, foreign objects become trapped beneath the hydrant's foot valve preventing full closure. Opening the hydrant a few turns and then closing it can flush out the obstructing material (see Figure 3-4). To prevent water hammer when operating a fire hydrant, the recommended turning rate is approximately 1 to 2 turns per 15 seconds, or 4 to 8 turns per minute. This slow and steady pace allows the water to flow gradually, minimizing the sudden changes in pressure that cause water hammer in the distribution system.

To prevent water hammer when operating a system valve, a good rule of thumb is to limit the turning rate to 1 full turn every 15–30 seconds, which translates to 2 to 4 turns per minute. This slow operation gives the system time to adjust to pressure changes and minimizes the risk of creating pressure surges.

Figure 3-4 Hydrant Opening

During flushing operations, ensure that the required valve line-up has been executed correctly. Fully close valves that are marked “to be closed” and note them in writing on the flushing plan to ensure they are reopened upon completion of flushing operations.

Operating crews must be aware that flushing operations deliberately stress the system and take precautions to control the situation. Abruptly stopping the flow of water by rapidly opening or closing a valve or hydrant will place considerable strain on the pipe, hydrants, and fittings. If these appurtenances are in deteriorated condition, the resulting water hammer can cause serious damage and leaks. To prevent surges during flushing, the operating crew must ensure that hydrants and valves are opened and closed slowly. The standard recommendation is to take 5 to 10 seconds for each complete turn of the operating nut for hydrants, and 2 to 3 three seconds for each complete turn of the operating nut for valves.

3.3.3 Flow Testing

Flow from hydrants normally varies from 30 – 220 L/s (500 – 3,500 gpm), depending on the system's pressure. A hydrant that fails to yield the minimum flow rate indicates a possible obstruction in the flow stream or a partial or total closure of a valve that should be open. The results of a hydrant capacity test during flushing demonstrate the system strength. For instance, a flow rate of 95 L/s (1500 gpm) at a static pressure of 410 kPa (60 psi) and a residual pressure of 345 kPa (50 psi) indicates a strong system. A difference of greater than 170 kPa (25 psi) between static and residual pressure indicates a problem.

When using a pressure gauge attached to a hydrant cap to measure static or residual pressure, place the petcock bleeder in the open position prior to opening the hydrant. Ensure that the cap attached to the hydrant has the same threads as the hydrant orifice. Unmatched threads may result in damage to the flushing crew, equipment, or property. Open the hydrant several turns to allow the entrapped air to escape slowly through the petcock bleeder. Once all the air is exhausted, a steady and continuous flow stream should emanate from the petcock bleeder. This indicates the gauge reading should now be accurate. If the hydrant cap is not equipped with a petcock bleeder, carefully unscrew the cap off the second hydrant orifice just enough to similarly allow the entrapped air to escape slowly. Following release of the entrapped air, retighten the hydrant cap until leaking water stops.

Prior to using the pitot tube, open the hydrant fully until water clears, otherwise debris coming out from the hydrant could produce inaccurate readings, damage the pitot tube or cause injury. When using a hand-held pitot gauge, ensure operators take readings according to the manufacturer's recommendations.

3.3.4 Valve and Hydrant Maintenance

Distribution system components, including valves and hydrants, require regular inspection and maintenance. Neglecting these systems can compromise water quality, decrease firefighting readiness, and threaten public health. A vigorous annual preventive maintenance program for valves and hydrants can ensure that key

components of the distribution system are structurally sound and fully operational and maximize the effectiveness and efficiency of the UDF.

Even in well operated and maintained distribution systems, a significant percentage of the valves that should be open are often closed. As a minimum, an annual valve exercising program should be conducted to eliminate artificial dead ends and minimize incidences of broken valves during flushing operations. Figure 3-5 illustrates a valve exercise example. A routine valve exercise program can also alleviate difficulties in opening and closing distribution system valves. Typically, valves that are 50 years or older should be replaced when signs of wear, poor operation, or incomplete closure (leakage) appear, or when it becomes difficult to obtain replacement parts.

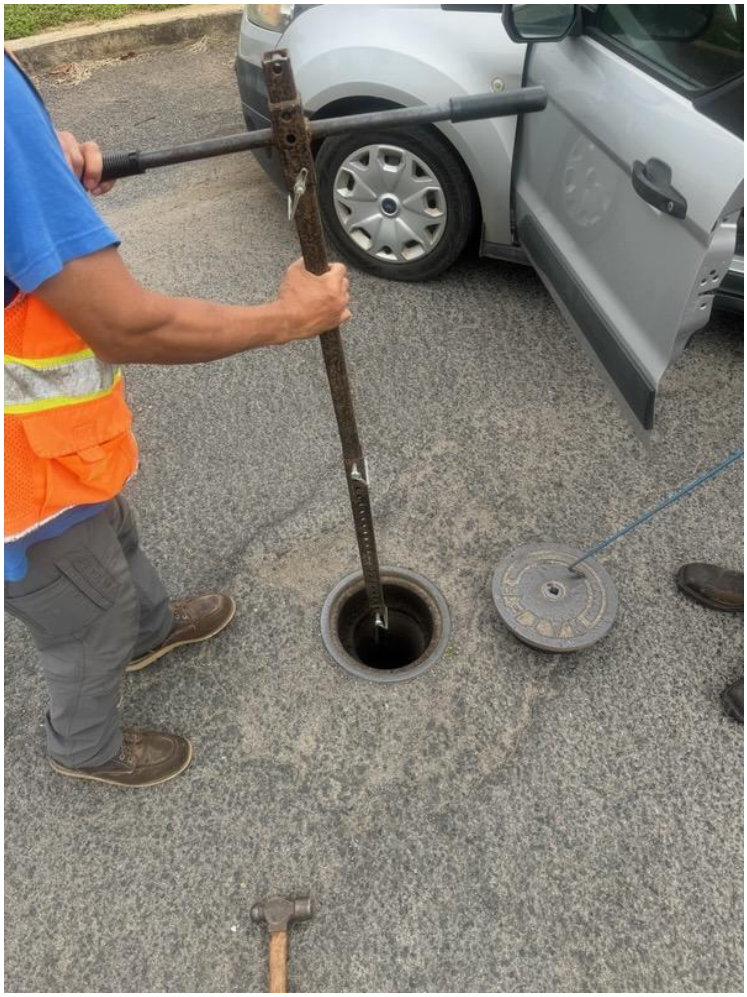


Figure 3-5 Valve Exercise Example

Annual hydrant inspection and maintenance should also be performed to maintain firefighting readiness and operable hydrants for flushing. Inspection can take place during the UDF.

3.3.5 Other Recommendations

After instituting the UDF plan, operators should take measures to refine and improve the plan's effectiveness, specifically in areas such as water quality and cost. These measures include, but are not limited to, the following:

1. Water quality complaints that are based on
    - Discoloration (yellow, brown, or red water)
    - Sediments or particles in water
    - Unpleasant taste or odor
2. Chlorine residuals are tested when routine monitoring or customer complaints indicate low chlorine residuals as per AWWA/EPA guidelines
    - Below 0.2 mg/L free chlorine
    - Or below 0.5 mg/L total chlorine

- Analyze the time-to-clear to assess the effectiveness of the flushing plan and determine whether the period between flushing should be increased or decreased. This is especially important in the case of spot flushing areas with chronic problems.
- Experiment with sampling locations and water quality parameters to see if the decision to flush can be based on water quality.
- Track costs for manpower, equipment, water use, etc., to monitor improvement/efficiency.
- Develop centralized locations, such as Call Centers, for receiving customer complaints, especially during the flushing operations. Customer complaints can provide valuable feedback on the improvement of water quality as it relates to the flushing plan.
- Use computer tools such as a database management system (DBMS). A DBMS is a software package that allows input, storage, manipulation, and retrieval of data. Information important to a flushing plan, such as water quality, flushing activity, customer complaints, maintenance, repair, flow tests, hydrant tests, and pressure can be stored and assigned to particular locations and times. The DBMS (like GIS database) allows comparison of time and location trends as well as relationships among water quality and distribution system variables.

3.4 STANDARD OPERATING PROCEDURE FOR UDF

This standard operating procedure applies to all JBPHH developed loops and should be implemented by a minimum of two-person (2) crew with all required equipment and tools.

3.4.1 Equipment & Materials

To enable the crew to perform the UDF plan flushing operation smoothly and efficiently, the crew should have the following equipment and tools:

- Utility truck(s)
- UDF maps for the loop that is being flushed
- Tablet or laptop with flushing log Excel sheet loaded
- Fire hydrant wrenches
- Valve keys
- Screw drivers
- Diffuser(s) with dechlorinating tablets holder and flow meter built-in
- Pressure gauge(s)
- Chlorine residual testing kit
- Safety cones and barricades
- Personal Protective Equipment

3.4.2 Pre-Flushing Preparation

Before starting the UDF plan flushing operation, the crew needs to check the following steps:

(b) (3) (B) [redacted]

- [redacted]
- [redacted]

(b) (3) (B) [redacted]

(b) (3) (B) [redacted]

General Instructions

- Inform Waiawa production operators of flushing operation 2 days prior to actual flushing start
- Make sure that both Waiawa pumps are operational and in service
- UDF plan was designed to be implemented with one crew flushing one loop per day. However, the plan can be implemented with two separate crews, flushing a combined total of two loops per day
    - UDF Operation with one crew
        - Make sure at least one Halawa storage tank (S1 or S2) is in service and filled to at least 36 ft prior to starting.
    - UDF operation with two crews

        - Make sure both Halawa storage tanks (S1 and S2) are in service and filled to at least 36 ft prior to starting
- To implement UDF at Camp Smith
    - Make sure the pump station is fully operational
    - Make sure at least two water storage tanks are operational and filled to at least 12 ft prior to starting
- Verify which valves and hydrants will be used for the current step
- Verify that the residents and facilities were informed of the UDF operation in advance and that temporary discoloration or pressure fluctuation may occur
- Make sure that public works emergency repair crew(s) are available in case of a line, valve, or hydrant break
- Remove obstructions around flushing points
- Set up traffic cones and barricades around traffic areas as needed

3.4.3 Flushing Operation

1. Monitoring Hydrant – Pressure Gauge Setup (Crew Person 1)

Follow AWWA M17 guidelines when setting up the pressure gauge:

a. Inspect the hydrant for visible damage, leaks, or obstructions.
b. Use a hydrant wrench to remove the 2.5-inch cap.
c. Slowly open the hydrant by turning the operating nut counterclockwise at a rate of 4 to 8 turns per minute until water flows from the nozzle.
d. Let the hydrant flow until the water runs clear and is free of debris.
e. Close the hydrant by turning the operating nut clockwise at a rate of 4 to 8 turns per minute until water flow stops.
f. Attach the pressure gauge to the 2.5-inch nozzle and tighten it using the hydrant wrench.
g. Reopen the hydrant fully by turning the operating nut counterclockwise at the same controlled rate of 4 to 8 turns per minute.
h. Record the static pressure in Column H (Static Pres (PSI)) of the Excel log sheet.

2. Flushing Hydrant – Diffuser Setup (Crew Person 1)

Install diffuser(s) on the designated flushing hydrant(s) and ensure secure connections.

3. Dechlorination Preparation (Crew Person 1)

Check that the dechlorinating tablet holder is filled and ready for use.

4. Valve Operation (Crew Person 2)

   Operate all system valves according to the flushing sequence instructions, strictly following the valve-handling procedures outlined in the AWWA M44 manual and sections 3.5 and 3.6 of this report. Ensure valves are opened and closed gradually to avoid pressure surges (water hammer).

5. Pressure Logging (Crew Person 1)

Record the static pressure reading from the monitoring hydrant's pressure gauge in Column H (Static Pres in PSI) of the Excel log sheet.

6. Opening Flushing Hydrants
   a. Crew person 1 will open Flushing Hydrant 1, and
   b. Crew Person 2 will open Flushing Hydrant 2, if required by the flushing instructions, following the procedures outlined in the AWWA M17 manual.

Steps for Operating Each Flushing Hydrant:

a. Inspect the hydrant for visible damage, leaks, or obstructions.
b. Remove the 2.5-inch hydrant cap using a hydrant wrench.
c. Slowly open the hydrant by turning the operating nut counterclockwise until water begins to flow.
d. Allow the hydrant to flow until the water runs clear and free of debris.
e. Close the hydrant by turning the operating nut clockwise until water stops flowing.
f. Attach the hydrant diffuser to the 2.5-inch nozzle and tighten it securely using the hydrant wrench.

g. Reopen the hydrant slowly by turning the operating nut counterclockwise, typically 12 to 15 full turns depending on the hydrant model. Ensure the opening rate is slow and controlled to prevent pressure surges.

Steps for Flushing Operation Data Logging

Log the following entries into the Excel log sheet:

a. Log the Date: Enter the date of the operation in Column A (Date).
b. Log the Time: Record the time the operation begins in Column B (Time).
c. Log the Hydrant Number(s): Enter the number(s) of the hydrant(s) being used in Column D (Hyd #).
d. Log the Starting Time: Record the starting time of the flushing operation in Column X (Remarks).
e. Log the Residual Pressure: Record the residual pressure reading from the monitoring hydrant in Column I (Residual Pressure in PSI).
f. Log the Pitot Gauge Pressure for Flushing Hydrants: For the first flushing hydrant, record the pitot gauge pressure in Column J (Pitot 1 Pressure in PSI).
g. If additional hydrants are used, log the pitot gauge pressure for the second flushing hydrant in Column K (Pitot 2 Pressure in PSI).
h. Log the Stopping Time: Record the stopping time in Column X (Remarks).
i. Calculate and subtract the stopping time from the starting time to determine the total duration.
j. Log the Actual Flushing Time: Record the total duration time calculated in step g, in minutes, in Column V (Actual Time to Clear).
k. Log Turbidity Observations: If any turbidity is observed during the flushing process, note it in Column U (Turbidity).
l. Log Any Additional Remarks: Any additional observations or remarks should be entered in Column X (Remarks).

7. Chlorine Residual Testing (Crew Person 1)
   a. At the beginning of the flushing step, Crew Person 1 will test the chlorine residual.

b. If the flushing operation is initiated due to a low chlorine residual event, continue testing periodically until the target chlorine residual level is achieved.

8. Closing the Flushing Hydrant(s)

At the conclusion of the flushing operation, Crew Persons 1 and 2 will close the flushing hydrant(s) following the steps outlined in the AWWA M17 manual:

a. Close the hydrant slowly by turning the operating nut clockwise with a hydrant wrench. Turn at a controlled pace—typically 12 to 15 full turns, depending on the hydrant model at a rate of 4 to 8 turns per minute.
b. Remove the hydrant diffuser from the 2.5-inch nozzle using the hydrant wrench.
c. Reinstall the hydrant cap by first tightening it by hand, then using the hydrant wrench. Do not overtighten to avoid damaging the threads or cap.
d. Inspect the hydrant for any visible damage, leaks, or signs of malfunction after closure.

3.4.4 Post Flushing Operation

1. Valve Operation (Crew Person 2)
   a. Open and close system valves in accordance with the flushing step instructions.
   b. All valve operations must follow the procedures outlined in Section 3.4.3, Step 4 of this SOP and comply with AWWA M44 manual guidelines.

2. Hydrant Securing (Crew Persons 1 and 2)
   a. Remove the hydrant diffuser(s).
   b. Reinstall and hand-tighten the 2.5-inch hydrant cap(s), then secure with a hydrant wrench. Avoid over-tightening.

3. Pressure Gauge Removal (Crew Person 1)
   a. Detach the pressure gauge from the monitoring hydrant.

b. Replace and tighten the 2.5-inch cap on the monitoring hydrant using the hydrant wrench.

4. Hydrant Inspection (Crew Persons 1 and 2)
   a. Inspect all hydrants used to ensure they are fully closed and not leaking.

5. Site Restoration (Crew Person 2)
   a. Remove all traffic control equipment, including cones and barricades.
   b. Return all valve box covers and other infrastructure components to their original positions.

6. Final Area Check (Crew Persons 1 and 2)

a. Perform a final inspection of the surrounding area to confirm there are no active leaks or abnormal conditions before proceeding to the next flushing step.

3.5 VALVE CLOSING STANDARD OPERATION PROCEDURE

1. Initial Inspection
   a. Check for visible signs of leaks, corrosion, or any known operational issues.
   b. Ensure the valve box or vault is clean and free of debris or obstructions.
   c. Verify the valve's current position (fully open, partially closed, etc.).

2. Valve Closure Procedure
   a. Use the correct valve key to prevent over-torquing or damage.
   b. Apply steady torque in the closing direction for 5 to 10 turns.
   c. Reverse the direction for 2 to 3 turns to relieve pressure and free debris.
   d. Resume turning in the closing direction for another 5 to 10 turns.
   e. Repeat this cycle (forward-reverse-forward) until the valve is fully closed.
   f. Turn at a controlled rate of 2 to 4 turns per minute to avoid water hammer.
   g. Once closed, open the valve slightly (1–2 turns) to allow high-velocity water to clear sediment from the valve seat, then fully close again.

3. Final Checks

a. Inspect the valve bonnet, stem, and packing gland for any signs of leakage.

3.6 VALVE OPENING STANDARD OPERATING PROCEDURE

1. Controlled Opening
   a. Begin by turning the valve key one full turn, then pause to allow pressure stabilization.
   b. Continue opening slowly, maintaining a rate of 2 to 4 turns per minute to prevent water hammer.

2. Monitoring During Operation
   a. For large valves or those in high-flow systems, pause briefly at 25%, 50%, and 75% open to observe system response.
   b. Avoid over-torquing during the process to prevent internal damage.

3. Post-Opening Inspection
   a. Check for leaks around valve joints, packing areas, or connections.
   b. Monitor surrounding areas for any signs of abnormal pressure changes or system issues.

4 DECHLORINATION OF WATER DISCHARGES

Even at low concentrations, chlorine can be highly toxic to aquatic life. Therefore, consideration should be given to dechlorinating water discharges from distribution systems, especially during water-intensive operation and maintenance activities, such as flushing. UFC 3-230-02 section 6-3.3.2 Flushing Procedure states that during flushing operation “Dechlorinate any water discharged to state waters.” To assess the need for dechlorination during a water release, consider the following:

- The volume of discharged water
- The chlorine residual in the discharged water
- The proximity of the point of discharge to a natural aquatic system
- The volume or flow of the receiving environment available to dilute the release

Water discharges to sanitary sewers do not require dechlorination, only the approval of the appropriate local authorities. However, discharges to storm sewers or receiving waters generally require dechlorination when the discharge poses a threat to the receiving aquatic ecosystem. JBPHH personnel should refer to the Hawaii Department of Health “DEPARTMENT OF THE NAVY NAVY REGION HAWAII (COMNAVREG HI) SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEM (SMALL MS4) AND INDUSTRIAL FACILITIES” Discharge Permit No. HI S000257 for discharge details.

4.1 CHEMICAL REAGENTS

Five types of chemical reagents are widely used to neutralize chlorine residuals:

- Sodium sulfite (tablet)
- Sodium thiosulfate (powder)
- Sodium bisulfite (liquid)
- Citric acid
- Ascorbic acid

In water distribution systems, the most widely used dechlorinating agents are sodium sulfite and sodium thiosulfate. Available in solid form, these reagents are generally less hazardous to store and easier to handle in the field than sodium bisulfite.

A number of factors in the dechlorination process, including chemical storage and feed considerations, affect the choice of reagent. For example, sodium bisulfite is a pale yellow liquid, which may be purchased in 200 liter (55 gallon) drums in a concentrated 38% solution that is meter-pumped (in concentrated form) into the treated water flow stream. Sodium sulfite is commercially available in tablet form and, as such, is typically dissolved into the treated water flow stream. Finally, sodium thiosulfate is typically purchased in powder form in 22 to 45 kilogram (kg) (50 to 100 pound [lb]) bags, which are dissolved in water to produce a stock solution of known strength. The resulting solution is subsequently meter-pumped into the treated water flow stream. In summary, the chemical reagent selected directly affects the dechlorination process.

Another important consideration in choosing a dechlorinating agent is dissolved oxygen depletion. Reagents that contain or produce sulfite compounds, such as sodium sulfite and sodium bisulfite, can deplete the oxygen content of the treated water. Reducing the oxygen content can have adverse impacts on the biota of the receiving stream if excess chemicals are applied to the discharge stream. Care must be taken when using these chemicals to maintain the proper chemical dose. Monitoring of the oxygen levels may be warranted to ensure that dissolved oxygen concentrations are not depleted, especially in sensitive ecosystems.

4.2 CHEMICAL APPLICATION

The required dose of dechlorinating agent can be calculated based on the discharge flow and chlorine residual concentrations. The AWWA Standard for Disinfection of Water Mains (AWWA C-651-92) recommends the chemical doses listed in Table 4-1 to neutralize the given chlorine residual in 100,000 gallons of water.

Table 4-1 Dechlorination Dosage Requirements

Chlorine Residual	Sodium Bisulfite		Sodium Thiosulfate		Sodium Sulfite	
mg/L*	lbs	kg	lbs	kg	lbs	kg
1	1.2	0.5	1.2	0.5	1.4	0.6
2	2.5	1.1	2.4	1.1	2.9	1.3
10	12.5	5.7	12	5.4	14.6	6.6
50	62.6	28.4	60	27.2	73	33.1

* mg/L = milligrams per liter

Proper location and method of applying dechlorinating agents is crucial to the success of neutralizing disinfectants. The operator must ensure adequate mixing of the dechlorinating agent with the discharged water.

For liquid solutions, the dechlorinating agent should be applied to the discharge flow downstream of the fire hydrant and adjacent to the diffuser. There are also trailer-mounted, portable dechlorination feed systems and patented devices for tablet applications as shown in Figure 4-1.

Figure 4-1 Diffuser Mounted Dechlorination Feed

In this application, hydrant discharges are routed through a diffuser, which contains an integral tablet dispenser. A side stream dissolves the dechlorinating agent and combines it with the main discharge flow.

4.3 MONITORING REQUIREMENTS DURING DECHLORINATION

Monitoring flows from hydrants is a routine element of an efficient flushing program. It is typically done to ensure adequate flows are maintained and the appropriate flushing velocities are achieved. Total water usage can also be derived from these measurements. The calculated flow rates can be used to calculate the required amount of dechlorination agent.

The chlorine residual concentration should also be routinely monitored to ensure the dechlorination process is effective and no chlorine enters the receiving body of water.

4.4 DECHLORINATION STANDARD OPERATING PROCEDURE

1. Pre-Operation
   a. Ensure diffuser is free of cracks and clean.
   b. Check diffuser basket is in place and properly secured.
   c. Determine estimated flow rate (typically (b) (3) (B)
   d. Use manufacturer dosage chart to estimate the number of tablets needed based on chlorine residual and flow rate.
   e. Place ascorbic acid tablets in the diffuser basket.
   f. Position diffuser to direct water flow to appropriate drainage or vegetated area.
   g. Ensure diffuser outlet does not cause erosion or property damage.

2. Operation
   a. Slowly open the hydrant to allow water to pass through the diffuser as outlined in the AWWA M17 manual.
   b. Monitor for proper diffuser spray and water flow.
   c. After 1–2 minutes of flow, collect a sample from the diffuser outlet.
   d. Test for total chlorine residual using a test kit.

e. Target chlorine residual: <0.1 mg/L or non-detect.
f. If chlorine is still present, add more ascorbic acid tablets.
g. Retest until chlorine residual is zero or non-detectable.

3. Post-Operation
   a. Slowly close the hydrant to avoid water hammer as outlined in the AWWA M17 manual.
   b. Remove and inspect diffuser and basket for wear or clogging.

5 PUBLIC NOTIFICATION

Public notification is an important aspect of a UDF plan. In view of citizen sensitivity to apparent waste by a public agency, the sight of a utility crew flushing water into the street can trigger numerous unnecessary complaint calls. This is an especially sensitive situation for utilities attempting to increase customer implementation of water conservation measures. The best approach is a coordinated campaign of advanced notification to customers and training of the field crews to properly handle customer questions on the scene.

5.1 ADVANCE NOTIFICATION

Advance notification will consist of a public notice via email or bulletin boards. The notification should be sent a few days to a week in advance of flushing operations (see Appendix D for example notification brochures). Notifications should be coordinated with the Assistant Public Works Officer (APWO) for each respective area. APWO should be able to notify housing contractor (KTR) for widespread notice to residents.

If the distribution system has not been flushed for many years and suffers from a substantial biofilm buildup, an attachment to the email notification on the benefits of the flushing program might be desirable. In addition to communicating with the general public, specific sensitive base customers should be directly informed of the flushing plans through department head staff meetings.

The same channels used for advance notification can collect feedback during or after flushing. Appendix D provides an example of a card containing a few survey questions.

5.2 CREW TRAINING

Preventative maintenance crews are typically accustomed to handling citizen inquiries regarding work in process. As a result, addressing questions dealing with flushing is simply an extension of that familiar function. All that is required is a bit of time spent in

familiarizing the crews with the objectives of the flushing program, the general sequence in which flushing zones or loops will progress, and answers to the questions they will likely encounter (see Appendix E).

5.3 CALL CENTER

The Call Center, and the Environmental Affairs staff and/or the Public Affairs Office, should be briefed on the UDF plan. Briefing should include information about the program objectives, the expected benefits, the intended sequence for working through affected zones, an approximate schedule, an overview of the actual flushing process, information about noticeable effects (discolored water, sediment, etc.), and typical questions they can expect to be asked. The Call Center staff should also be provided with the name and phone number of a point of contact who can address any program details or technical aspects beyond the usual customer service representative's purview.

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APPENDIX A

JBPHH Water Distribution System Maps

(3 PLATES)

(b) (3) (B)

[redacted]

(b) (3) (B)

[redacted]

(b) (3) (B)

APPENDIX B

Flushing Loops for JBPHH

(TOTAL 42 PDF FILES)

JBPHH Pearl Harbor UDF Plan

- Combined 0 Area Sequence.pdf
- Combined 1 Manana Housing.pdf
- Combined 2 Pearl City.pdf
- Combined 3 Beckoning Point.pdf
- Combined 4 Ford Island.pdf
- Combined 5 West Loch.pdf
- Combined 6 Iroquois Point.pdf
- Combined 7 Puuloa Housing.pdf
- Combined 8 Puuloa Rifle Range.pdf
- Combined 9 McGrew Point.pdf
- Combined 10 Halawa.pdf
- Combined 11 Camp Smith.pdf
- Combined 12 Richardson Field.pdf
- Combined 13 Makalapa Housing.pdf
- Combined 14 Moanalua.pdf
- Combined 15 Moanalua Terrace.pdf
- Combined 16 Caitlin Park.pdf
- Combined 17 Doris Miller.pdf
- Combined 18 Radford Terrace.pdf
- Combined 19 Halsey Terrace.pdf
- Combined 20 Hale Moku.pdf
- Combined 21 Hokulani.pdf
- Combined 22 FISC.pdf
- Combined 23 Sub Base Pearl.pdf
- Combined 24 Naval Station Pearl.pdf
- Combined 25 Shipyard Pearl.pdf
- Combined 26 Hospital Point.pdf
- Combined 27 Ohana Nui.pdf

JBPHH Hickam UDF Plan

- Combo Hickam 00 Loop Sequence.pdf
- Combo Hickam 0 Loop Directory.pdf
- Combo Hickam 1 Zone4.pdf
- Combo Hickam 2 Zone5.pdf
- Combo Hickam 3 Zone6.pdf
- Combo Hickam 4 Zone7.pdf
- Combo Hickam 5 Zone8.pdf
- Combo Hickam 6 Zone2.pdf
- Combo Hickam 7 Zone1.pdf
- Combo Hickam 8 Zone12.pdf
- Combo Hickam 9 Zone9.pdf
- Combo Hickam 10 Zone3.pdf
- Combo Hickam 11 Zone10.pdf
- Combo Hickam 12 Zone11.pdf

APPENDIX C

Unidirectional Flushing Log

(61 PAGES)

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
1. Army National Guard/Manana Housing																							
		L1S1		10	2.5	2.5															0		
		L1S2		6	2.5	0															0		
		L1S3		10	2.5	2.5															0		
		L1S4		8	2.5	0															0		
		L1S5		8	2.5	0															0		
		L1S6		8	2.5	0															0		
		L1S7		8	2.5	0															0		
		L1S8																					
		Total																(b) (3) (B)			**0**		1

		L2S1		6	2.5	0															0		
		L2S2		6	2.5	0															0		
		L2S3		6	2.5	0															0		
		L2S4		6	2.5	0															0		
		L2S5		6	2.5	0															0		
		L2S6		8	2.5	0															0		
		L2S7		6	2.5	0															0		
		L2S8		6	2.5	0															0		
		L2S9																					
		Total																(b) (3) (B)			**0**		2

Army National Guard/Manana Housing Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

2. Pearl City

		L1S1		12	2.5	2.5	[redacted]														0	
		L1S2		6	2.5	0															0	
		L1S3		6	2.5	0															0	
		L1S4		6	2.5	0															0	
		L1S5		6	2.5	0															0	
		L1S6		8	2.5	0															0	
		L1S7		12	2.5	2.5															0	
		L1S8																				
		Total																[redacted]			**0**	3

		L2S1		12	2.5	2.5	[redacted]														0	
		L2S2		8	2.5	0															0	
		L2S3		8	2.5	0															0	
		L2S4		12	2.5	2.5															0	
		L2S5		8	2.5	0															0	
		L2S6		12	2.5	2.5															0	
		L2S7																				
		Total																[redacted]			**0**	4

		L3S1		8	2.5	0	[redacted]														0	
		L3S2		8	2.5	0															0	
		L3S3		8	2.5	0															0	
		L3S4		8	2.5	0															0	
		L3S5		8	2.5	0															0	
		L3S6		8	2.5	0															0	
		L3S7		8	2.5	0															0	
		L3S8																			0	
		Total																[redacted]			**0**	5

		L4S1		8	2.5	0	[redacted]														0	
		L4S2		8	2.5	0															0	
		L4S3		8	2.5	0															0	
		L4S4		8	2.5	0															0	
		L4S5		6	2.5	0															0	
		L4S6		6	2.5	0															0	
		L4S7		6	2.5	0															0	
		L4S8																			0	
		Total																[redacted]			**0**	6

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L5S1		8	2.5	0	(b) (3) (B)														0		
		L5S2		8	2.5	0															0		
		L5S3		6	2.5	0															0		
		L5S4		6	2.5	0															0		
		L5S5		6	2.5	0															0		
		L5S6		6	2.5	0															0		
		L5S7		6	2.5	0															0		
		L5S8																					
		Total																(b) (3) (B)			**0**		7
		L6S1		8	2.5	0	(b) (3) (B)														0		
		L6S2		8	2.5	0															0		
		L6S3		8	2.5	0															0		
		L6S4		6	2.5	0															0		
		L6S5		8	2.5	0															0		
		L6S6		6	2.5	0															0		
		L6S7		6	2.5	0															0		
		L6S8																			0		
		Total																(b) (3) (B)			**0**		8
		L7S1		12	2.5	2.5	(b) (3) (B)														0		
		L7S2		6	2.5	0															0		
		L7S3		6	2.5	0															0		
		L7S4		8	2.5	0															0		
		L7S5		6	2.5	0															0		
		L7S6		8	2.5	0															0		
		L7S7		6	2.5	0															0		
		L7S8		6	2.5	0															0		
		L7S9																					
		Total																(b) (3) (B)			**0**		9
		L8S1		8	2.5	0	(b) (3) (B)														0		
		L8S2		8	2.5	0															0		
		L8S3		6	2.5	0															0		
		L8S4		8	2.5	0															0		
		L8S5		6	2.5	0															0		
		L8S6		6	2.5	0															0		
		L8S7		8	2.5	0															0		
		L8S8																					
		Total																(b) (3) (B)			**0**		10

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
		L9S1		8	2.5	0	[redacted]														0	
		L9S2		8	2.5	0															0	
		L9S3		8	2.5	0															0	
		L9S4		8	2.5	0															0	
		L9S5		6	2.5	0															0	
		L9S6		6	2.5	0															0	
		L9S7		6	2.5	0															0	
		L9S8		6	2.5	0															0	
		L9S9																				
		Total																[redacted]			**0**	

11

Pearl City Total Water Usage	[redacted]	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

3. Beckoning Point

		L1S1		12	2.5	2.5	(b) (3) (B)														0	
		L1S2		6	2.5	0															0	
		L1S3		6	2.5	0															0	
		L1S4																			0	
		Total																(b) (3) (B)			**0**	

Beckoning Point Total Water Usage [redacted] **Gallons** **0** **Gallons**

12

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
4. Ford Island																							
		L1S1		12	2.5	2.5															0		
		L1S2		12	2.5	2.5															0		
		L1S3		12	2.5	2.5															0		
		L1S4		12	2.5	2.5															0		
		L1S5		12	2.5	2.5															0		
		L1S6		12	2.5	2.5															0		
		L1S7																					
		Total																(b) (3) (B)			**0**		13
		L2S1		8	2.5	0															0		
		L2S2		10	2.5	2.5															0		
		L2S3		10	2.5	2.5															0		
		L2S4		8	2.5	0															0		
		L2S5		8	2.5	0															0		
		L2S6		8	2.5	0															0		
		L2S7		6	2.5	0															0		
		L2S8		6	2.5	0															0		
		L2S9																			0		
		Total																(b) (3) (B)			**0**		14
		L3S1		8	2.5	0															0		
		L3S2		8	2.5	0															0		
		L3S3		8	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		8	2.5	0															0		
		L3S6		8	2.5	0															0		
		L3S7																			0		
		Total																(b) (3) (B)			**0**		15
		L4S1		8	2.5	0															0		
		L4S2		8	2.5	0															0		
		L4S3		6	2.5	0															0		
		L4S4		6	2.5	0															0		
		L4S5		8	2.5	0															0		
		L4S6		6	2.5	0															0		
		L4S7		8	2.5	0															0		
		L4S8		8	2.5	0															0		
		L4S9																			0		
		Total																(b) (3) (B)			**0**		16

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L5S1		8	2.5	0															0		
		L5S2		8	2.5	0															0		
		L5S3		16	2.5	2.5															0		
		L5S4		6	2.5	0															0		
		L5S5		8	2.5	0															0		
		L5S6		6	2.5	0															0		
		L5S7		8	2.5	0															0		
		L5S8																			0		
		Total																(b) (3) (B)			**0**		17
		L6S1		8	2.5	0															0		
		L6S2		8	2.5	0															0		
		L6S3		8	2.5	0															0		
		L6S4		6	2.5	0															0		
		L6S5		8	2.5	0															0		
		L6S6		6	2.5	0															0		
		L6S7		8	2.5	0															0		
		L6S8																			0		
		Total																(b) (3) (B)			**0**		18
		L7S1		8	2.5	0															0		
		L7S2		8	2.5	0															0		
		L7S3		8	2.5	0															0		
		L7S4		8	2.5	0															0		
		L7S5		8	2.5	0															0		
		L7S6		6	2.5	0															0		
		L7S7		6	2.5	0															0		
		L7S8		6	2.5	0															0		
		L7S9																			0		
		Total																(b) (3) (B)			**0**		19
		L8S1		8	2.5	0															0		
		L8S2		8	2.5	0															0		
		L8S3		8	2.5	0															0		
		L8S4		8	2.5	0															0		
		L8S5		8	2.5	0															0		
		L8S6		8	2.5	0															0		
		L8S7		8	2.5	0															0		
		L8S8		8	2.5	0															0		
		L7S9																			0		
		Total																(b) (3) (B)			**0**		20
		L9S1		8	2.5	0															0		
		L9S2		6	2.5	0															0		
		L9S3		8	2.5	0															0		
		L9S4		8	2.5	0															0		
		L9S5		12	2.5	2.5															0		
		L9S6		8	2.5	0															0		
		L9S9																			0		
		Total																(b) (3) (B)			**0**		21

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L10S1		8	2.5		(b) (3) (B)														0		
		L10S2		8	2.5																0		
		L10S3		8	2.5																0		
		L10S4		6	2.5																0		
		L10S5		6	2.5																0		
		L10S6		8	2.5																0		
		L10S7		12	2.5	2.5															0		
		L10S8																			0		
		Total																(b) (3) (B)			**0**		22
		L11S1		6	2.5		(b) (3) (B)														0		
		L11S2		8	2.5																0		
		L11S3		6	2.5																0		
		L11S4		6	2.5																0		
		L11S5		12	2.5	2.5															0		
		L11S6		12	2.5	2.5															0		
		L11S7		12	2.5	2.5															0		
		L11S8		8	2.5																0		
		L11S9																			0		
		Total																(b) (3) (B)			**0**		23
		L12S1		12	2.5	2.5	(b) (3) (B)														0		
		L12S2		8	2.5	0															0		
		L12S3		8	2.5	0															0		
		L12S4		8	2.5	0															0		
		L12S5		6	2.5	0															0		
		L12S6		12	2.5	2.5															0		
		L12S7		6	2.5	0															0		
		L12S8																			0		
		Total																(b) (3) (B)			**0**		24
		L13S1		12	2.5	2.5	(b) (3) (B)														0		
		L13S2		12	2.5	2.5															0		
		L13S3		16	2.5	2.5															0		
		L13S4		6	2.5	0															0		
		L13S5		6	2.5	0															0		
		L13S6																			0		
		Total																(b) (3) (B)			**0**		25
Ford Island Total Water Usage																		(b) (3) (B)		**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
5. West Loch																							
		L1S1		12	2.5	2.5	(b) (3) (B)														0		
		L1S2		12	2.5	2.5															0		
		L1S3		10	2.5	2.5															0		
		L1S4		6	2.5	0															0		
		L1S5		6	2.5	0															0		
		L1S6		8	2.5	0															0		
		L1S7		8	2.5	0															0		
		L1S8																					
		Total																(b) (3) (B)			**0**		26
		L2S1		12	2.5	2.5	(b) (3) (B)														0		
		L2S2		12	2.5	2.5															0		
		L2S3		6	2.5	0															0		
		L2S4		6	2.5	0															0		
		L2S5		6	2.5	0															0		
		L2S6		8	2.5	0															0		
		L2S7																			0		
		Total																(b) (3) (B)			**0**		27
		L3S1		8	2.5	0	(b) (3) (B)														0		
		L3S2		12	2.5	2.5															0		
		L3S3		8	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		8	2.5	0															0		
		L3S6		8	2.5	0															0		
		L3S7																			0		
		Total																(b) (3) (B)			**0**		28
		L4S1		8	2.5	0	(b) (3) (B)														0		
		L4S2		12	2.5	2.5															0		
		L4S3		12	2.5	2.5															0		
		L4S4		12	2.5	2.5															0		
		L4S5		12	2.5	2.5															0		
		L4S6																			0		
		Total																(b) (3) (B)			**0**		29
West Loch Total Water Usage																		(b) (3) (B)		**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
6. Iroquois Point																							
		L1S1		8	2.5	0	(b) (3) (B)														0		
		L1S2		8	2.5	0															0		
		L1S3		8	2.5	0															0		
		L1S4		6	2.5	0															0		
		L1S5		6	2.5	0															0		
		L1S6		6	2.5	0															0		
		L1S7		6	2.5	0															0		
		L1S8																					
		Total																(b) (3) (B)			**0**		30
		L2S1		8	2.5	0	(b) (3) (B)														0		
		L2S2		6	2.5	0															0		
		L2S3		8	2.5	0															0		
		L2S4		6	2.5	0															0		
		L2S5		6	2.5	0															0		
		L2S6		6	2.5	0															0		
		L2S7		8	2.5	0															0		
		L2S8		6	2.5	0															0		
		L2S9																					
		Total																(b) (3) (B)			**0**		31
		L3S1		8	2.5	0	(b) (3) (B)														0		
		L3S2		8	2.5	0															0		
		L3S3		6	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		6	2.5	0															0		
		L3S6		8	2.5	0															0		
		L3S7		6	2.5	0															0		
		L3S8																					
		Total																(b) (3) (B)			**0**		32
		L4S1		8	2.5	0	(b) (3) (B)														0		
		L4S2		6	2.5	0															0		
		L4S3		6	2.5	0															0		
		L4S4		6	2.5	0															0		
		L4S5		6	2.5	0															0		
		L4S6		6	2.5	0															0		
		L4S7		6	2.5	0															0		
		L4S8																					
		Total																(b) (3) (B)			**0**		33

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L5S1		8	2.5	0															0		
		L5S2		8	2.5	0															0		
		L5S3		8	2.5	0															0		
		L5S4		8	2.5	0															0		
		L5S5		8	2.5	0															0		
		L5S6		12	2.5	2.5															0		
		L5S7		6	2.5	0															0		
		L5S8																					
		Total																(b) (3) (B)			**0**		34
		L6S1		8	2.5	0															0		
		L6S2		6	2.5	0															0		
		L6S3		6	2.5	0															0		
		L6S4		6	2.5	0															0		
		L6S5		6	2.5	0															0		
		L6S6		6	2.5	0															0		
		L6S7		6	2.5	0															0		
		L6S8																					
		Total																(b) (3) (B)			**0**		35
		L7S1		6	2.5	0															0		
		L7S2		6	2.5	0															0		
		L7S3		6	2.5	0															0		
		L7S4		6	2.5	0															0		
		L7S5		6	2.5	0															0		
		L7S6		8	2.5	0															0		
		L7S7		8	2.5	0															0		
		L7S8																					
		Total																(b) (3) (B)			**0**		36
		L8S1		6	2.5	0															0		
		L8S2		6	2.5	0															0		
		L8S3		6	2.5	0															0		
		L8S4		6	2.5	0															0		
		L8S5		6	2.5	0															0		
		L8S6		6	2.5	0															0		
		L8S7																					
		Total																(b) (3) (B)			**0**		37
Iroquois Point Total Water Usage																		(b) (3) (B)		**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

7. Puuloa Housing

		L1S1		10	2.5	2.5	[redacted]														0	
		L1S2		10	2.5	2.5															0	
		L1S3		10	2.5	2.5															0	
		L1S4		10	2.5	2.5															0	
		L1S5		8	2.5	0															0	
		L1S6		8	2.5	0															0	
		L1S7		8	2.5	0															0	
		L1S8		8	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	

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Puuloa Housing Total Water Usage (b) (3) (B) **Gallons** **0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

8. Puuloa Rifle Range

		L1S1		8	2.5	0	(b) (3) (B)														0	
		L1S2		8	2.5	0															0	
		L1S3		8	2.5	0															0	
		L1S4		8	2.5	0															0	
		L1S5		6	2.5	0															0	
		L1S6		8	2.5	0															0	
		L1S7		6	2.5	0															0	
		L1S8		6	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	

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Puuloa Rifle Range Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

9. McGrew Point

		L1S1		12	2.5	2.5	(b) (3) (B)														0	
		L1S2		6	2.5	0															0	
		L1S3		8	2.5	0															0	
		L1S4		6	2.5	0															0	
		L1S5		6	2.5	0															0	
		L1S6		6	2.5	0															0	
		L1S7		6	2.5	0															0	
		L1S8		6	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	

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		L2S1		6	2.5	0	(b) (3) (B)														0	
		L2S2		6	2.5	0															0	
		L2S3		6	2.5	0															0	
		L2S4		6	2.5	0															0	
		L2S5		6	2.5	0															0	
		L2S6		6	2.5	0															0	
		L2S7																			0	
		Total																(b) (3) (B)			**0**	

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McGrew Point Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

10. Halawa

		L1S1		8	2.5	0	(b) (3) (B)														0	
		L1S2		6	2.5	0															0	
		L1S3		6	2.5	0															0	
		L1S4		6	2.5	0															0	
		L1S5																			0	
		Total																(b) (3) (B)			**0**	

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Halawa Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
11. Camp Smith																							
		L1S1		6	2.5	0															0		
		L1S2		6	2.5	0															0		
		L1S3		6	2.5	0															0		
		L1S4		8	2.5	0															0		
		L1S5		8	2.5	0															0		
		L1S6		8	2.5	0															0		
		L1S7		8	2.5	0															0		
		L1S8																			0		
		Total																			**0**		43
		L2S1		8	2.5	0															0		
		L2S2		8	2.5	0															0		
		L2S3		6	2.5	0															0		
		L2S4		8	2.5	0															0		
		L2S5		8	2.5	0															0		
		L2S6		6	2.5	0															0		
		L2S7		8	2.5	0															0		
		L2S8		8	2.5	0															0		
		L2S9																					
		Total																			**0**		44
		L3S1		6	2.5	0															0		
		L3S2		6	2.5	0															0		
		L3S3		6	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		6	2.5	0															0		
		L3S6		6	2.5	0															0		
		L3S7																					
		Total																			**0**		45
		L4S1		10	2.5	2.5															0		
		L4S2		10	2.5	2.5															0		
		L4S3		10	2.5	2.5															0		
		L4S4		10	2.5	2.5															0		
		L4S5		10	2.5	2.5															0		
		L4S6																					
		Total																			**0**		46
Camp Smith Total Water Usage																				**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

12. Richardson Field

		L1S1		6	2.5	0	(b) (3) (B)														0	
		L1S2		6	2.5	0															0	
		L1S3		6	2.5	0															0	
		L1S4		8	2.5	0															0	
		L1S5		8	2.5	0															0	
		L1S6		6	2.5	0															0	
		L1S7		6	2.5	0															0	
		L1S8		6	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	

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Richardson Field Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
13. Makalapa Housing (BMK)																							
		L1S1		8	2.5	0																0	
		L1S2		8	2.5	0																0	
		L1S3		8	2.5	0																0	
		L1S4		6	2.5	0																0	
		L1S5		12	2.5	2.5																0	
		L1S6		8	2.5	0																0	
		L1S7		12	2.5	2.5																0	
		L1S8		6	2.5	0																0	
		L1S9																					
		Total																				**0**	

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		L2S1		6	2.5	0																0	
		L2S2		8	2.5	0																0	
		L2S3		8	2.5	0																0	
		L2S4		6	2.5	0																0	
		L2S5		6	2.5	0																0	
		L2S6		6	2.5	0																0	
		L2S7		6	2.5	0																0	
		L2S8																					
		Total																				**0**	

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		L3S1		8	2.5	0																0	
		L3S2		6	2.5	0																0	
		L3S3		8	2.5	0																0	
		L3S4		8	2.5	0																0	
		L3S5		8	2.5	0																0	
		L3S6		8	2.5	0																0	
		L3S7		8	2.5	0																0	
		L3S8																					
		Total																				**0**	

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		L4S1		8	2.5	0																0	
		L4S2		8	2.5	0																0	
		L4S3		8	2.5	0																0	
		L4S4		8	2.5	0																0	
		L4S5		8	2.5	0																0	
		L4S6		6	2.5	0																0	
		L4S7		6	2.5	0																0	
		L4S8																					
		Total																				**0**	

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Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
		L5S1		8	2.5	0	[redacted]														0	
		L5S2		6	2.5	0															0	
		L5S3		8	2.5	0															0	
		L5S4		6	2.5	0															0	
		L5S5		6	2.5	0															0	
		L5S6		8	2.5	0															0	
		L5S7		8	2.5	0															0	
		L5S8																				
		Total																(b) (3) (B)			**0**	

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		L6S1		8	2.5	0	[redacted]														0	
		L6S2		8	2.5	0															0	
		L6S3		6	2.5	0															0	
		L6S4		8	2.5	0															0	
		L6S5		8	2.5	0															0	
		L6S6		6	2.5	0															0	
		L6S6		8	2.5	0															0	
		L6S8		6	2.5	0															0	
		L6S9																				
		Total																(b) (3) (B)			**0**	

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Makalapa Housing Total Water Usage	[redacted]	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
14. Moanalua																						
		L1S1		12	2.5	2.5															0	
		L1S2		12	2.5	2.5															0	
		L1S3		6	2.5	0															0	
		L1S4		6	2.5	0															0	
		L1S5		12	2.5	2.5															0	
		L1S6		12	2.5	2.5															0	
		L1S7		12	2.5	2.5															0	
		L1S8		6	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	54
		L2S1		12	2.5	2.5															0	
		L2S2		12	2.5	2.5															0	
		L2S3		8	2.5	0															0	
		L2S4		8	2.5	0															0	
		L2S5		8	2.5	0															0	
		L2S6		8	2.5	0															0	
		L2S7		8	2.5	0															0	
		L2S8																				
		Total																(b) (3) (B)			**0**	55
Moanalua Total Water Usage																		(b) (3) (B)		**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
15. Moanalua Terrace																							
		L1S1		12	2.5	2.5															0		
		L1S2		12	2.5	2.5															0		
		L1S3		12	2.5	2.5															0		
		L1S4		12	2.5	2.5															0		
		L1S5		12	2.5	2.5															0		
		L1S6		12	2.5	2.5															0		
		L1S7		12	2.5	2.5															0		
		L1S8																					
		Total																(b) (3) (B)			**0**		56
		L2S1		8	2.5	0															0		
		L2S2		8	2.5	0															0		
		L2S3		8	2.5	0															0		
		L2S4		8	2.5	0															0		
		L2S5		8	2.5	0															0		
		L2S6		8	2.5	0															0		
		L2S7		8	2.5	0															0		
		L2S8																					
		Total																(b) (3) (B)			**0**		57
		L3S1		8	2.5	0															0		
		L3S2		8	2.5	0															0		
		L3S3		8	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		8	2.5	0															0		
		L3S6		8	2.5	0															0		
		L3S7		8	2.5	0															0		
		L3S8																					
		Total																(b) (3) (B)			**0**		58
		L4S1		8	2.5	0															0		
		L4S2		8	2.5	0															0		
		L4S3		8	2.5	0															0		
		L4S4		8	2.5	0															0		
		L4S5		8	2.5	0															0		
		L4S6		8	2.5	0															0		
		L4S7		8	2.5	0															0		
		L4S8																					
		Total																(b) (3) (B)			**0**		59

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
		L5S1		12	2.5	2.5	[redacted]														0	
		L5S2		12	2.5	2.5															0	
		L5S3		8	2.5	0															0	
		L5S4		8	2.5	0															0	
		L5S5		8	2.5	0															0	
		L5S6		8	2.5	0															0	
		L5S7		8	2.5	0															0	
		L5S8		8	2.5	0															0	
		L5S9																				
		Total																(b) (3) (B)			**0**	

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Moanalua Terrace Total Water Usage (b) (3) (B) **Gallons** **0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
16. Caitlin Park																							
		L1S1		12	2.5	2.5																0	
		L1S2		8	2.5	0																0	
		L1S3		12	2.5	2.5																0	
		L1S4		12	2.5	2.5																0	
		L1S5		8	2.5	0																0	
		L1S6		6	2.5	0																0	
		L1S7		6	2.5	0																0	
		L1S8																				0	
		Total																(b) (3) (B)				**0**	61
		L2S1		6	2.5	0																0	
		L2S2		6	2.5	0																0	
		L2S3		6	2.5	0																0	
		L2S4		6	2.5	0																0	
		L2S5		6	2.5	0																0	
		L2S6		6	2.5	0																0	
		L2S7		6	2.5	0																0	
		L2S8																				0	
		Total																(b) (3) (B)				**0**	62
		L3S1		12	2.5	2.5																0	
		L3S2		12	2.5	2.5																0	
		L3S3		12	2.5	2.5																0	
		L3S4		8	2.5	0																0	
		L3S5		8	2.5	0																0	
		L3S6		6	2.5	0																0	
		L3S7		8	2.5	0																0	
		L3S8		8	2.5	0																0	
		L3S9																				0	
		Total																(b) (3) (B)				**0**	63
		L4S1		6	2.5	0																0	
		L4S2		6	2.5	0																0	
		L4S3		6	2.5	0																0	
		L4S4		8	2.5	0																0	
		L4S5		6	2.5	0																0	
		L4S6		6	2.5	0																0	
		L4S7		6	2.5	0																0	
		L4S8																				0	
		Total																(b) (3) (B)				**0**	64

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
		L5S1		12	2.5	2.5															0	
		L5S2		12	2.5	2.5															0	
		L5S3		8	2.5	0															0	
		L5S4		8	2.5	0															0	
		L5S5		6	2.5	0															0	
		L5S6		6	2.5	0															0	
		L5S7		6	2.5	0															0	
		L5S8																			0	
		Total																(b) (3) (B)			**0**	
		L6S1		6	2.5	0															0	
		L6S2		8	2.5	0															0	
		L6S3		8	2.5	0															0	
		L6S4		6	2.5	0															0	
		L6S5		6	2.5	0															0	
		L6S6																			0	
		Total																(b) (3) (B)			**0**	

(b) (3) (B)

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(b) (3) (B)

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Caitlin Park Total Water Usage [redacted] **Gallons** **0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

17. Doris Miller

		L1S1		12	2.5	2.5	(b) (3) (B)														0	
		L1S2		6	2.5	0															0	
		L1S3		12	2.5	2.5															0	
		L1S4		12	2.5	2.5															0	
		L1S5		8	2.5	0															0	
		L1S6		8	2.5	0															0	
		L1S7		12	2.5	2.5															0	
		L1S8		8	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	

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		L2S1		8	2.5	0	(b) (3) (B)														0	
		L2S2		8	2.5	0															0	
		L2S3		8	2.5	0															0	
		L2S4		8	2.5	0															0	
		L2S5		6	2.5	0															0	
		L2S6		8	2.5	0															0	
		L2S7		8	2.5	0															0	
		L2S8		8	2.5	0															0	
		L2S9																				
		Total																(b) (3) (B)			**0**	

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Doris Miller Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
18. Radford Terrace																							
		L1S1		8	2.5	0																0	
		L1S2		6	2.5	0																0	
		L1S3		8	2.5	0																0	
		L1S4		8	2.5	0																0	
		L1S5		12	2.5	2.5																0	
		L1S6		12	2.5	2.5																0	
		L1S7		8	2.5	0																0	
		L1S8		8	2.5	0																0	
		L1S9																					
		Total																(b) (3) (B)				**0**	69
		L2S1		8	2.5	0																0	
		L2S2		8	2.5	0																0	
		L2S3		8	2.5	0																0	
		L2S4		8	2.5	0																0	
		L2S5		8	2.5	0																0	
		L2S6		8	2.5	0																0	
		L2S7		8	2.5	0																0	
		L2S8																					
		Total																(b) (3) (B)				**0**	70
		L3S1		8	2.5	0																0	
		L3S2		8	2.5	0																0	
		L3S3		8	2.5	0																0	
		L3S4		8	2.5	0																0	
		L3S5		8	2.5	0																0	
		L3S6		8	2.5	0																0	
		L3S7		8	2.5	0																0	
		L3S8																					
		Total																(b) (3) (B)				**0**	71
		L4S1		12	2.5	2.5																0	
		L4S2		8	2.5	0																0	
		L4S3		12	2.5	2.5																0	
		L4S4																					
		Total																(b) (3) (B)				**0**	72
		L5S1		8	2.5	0																0	
		L5S2		8	2.5	0																0	
		L5S3		6	2.5	0																0	
		L5S4		8	2.5	0																0	
		L5S5		8	2.5	0																0	
		L5S6																					
		Total																(b) (3) (B)				**0**	73
Radford Terrace Total Water Usage																		(b) (3) (B)		**Gallons**		**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
19. Halsey Terrace																							
		L1S1		6	2.5	0	(b) (3) (B)														0		
		L1S2		8	2.5	0															0		
		L1S3		6	2.5	0															0		
		L1S4		8	2.5	0															0		
		L1S5		6	2.5	0															0		
		L1S6		6	2.5	0															0		
		L1S7																			0		
		Total																(b) (3) (B)			**0**		74
		L2S1		8	2.5	0	(b) (3) (B)														0		
		L2S2		8	2.5	0															0		
		L2S3		8	2.5	0															0		
		L2S4		8	2.5	0															0		
		L2S5		8	2.5	0															0		
		L2S6																			0		
		Total																(b) (3) (B)			**0**		75
		L3S1		8	2.5	0	(b) (3) (B)														0		
		L3S2		8	2.5	0															0		
		L3S3		8	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		8	2.5	0															0		
		L3S6		8	2.5	0															0		
		L3S7		8	2.5	0															0		
		L3S8																			0		
		Total																(b) (3) (B)			**0**		76
		L4S1		8	2.5	0	(b) (3) (B)														0		
		L4S2		8	2.5	0															0		
		L4S2		8	2.5	0															0		
		L4S3		8	2.5	0															0		
		L4S3		8	2.5	0															0		
		L4S4		8	2.5	0															0		
		L4S4																			0		
		Total																(b) (3) (B)			**0**		77
		L5S1		12	2.5	2.5	(b) (3) (B)														0		
		L5S2		8	2.5	0															0		
		L5S3		8	2.5	0															0		
		L5S4		8	2.5	0															0		
		L5S5		8	2.5	0															0		
		L5S6		12	2.5	2.5															0		
		L5S7		8	2.5	0															0		
		L5S8																			0		
		Total																(b) (3) (B)			**0**		78

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L6S1		12	2.5	2.5	[redacted]														0		
		L6S2		8	2.5	0															0		
		L6S3		8	2.5	0															0		
		L6S4		8	2.5	0															0		
		L6S5		8	2.5	0															0		
		L6S6		8	2.5	0															0		
		L6S7																			0		
		Total																[redacted]			**0**		79
		L7S1		8	2.5	0	[redacted]														0		
		L7S2		8	2.5	0															0		
		L7S3		8	2.5	0															0		
		L7S4		6	2.5	0															0		
		L7S5		6	2.5	0															0		
		L7S6		6	2.5	0															0		
		L7S7		8	2.5	0															0		
		L7S8																			0		
		Total																[redacted]			**0**		80
		L8S1		8	2.5	0	[redacted]														0		
		L8S2		8	2.5	0															0		
		L8S3		8	2.5	0															0		
		L8S4		8	2.5	0															0		
		L8S5		8	2.5	0															0		
		L8S6		6	2.5	0															0		
		L8S7		8	2.5	0															0		
		L8S8		8	2.5	0															0		
		L8S9																			0		
		Total																[redacted]			**0**		81

Halsey Terrace Total Water Usage	[redacted]	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
20. Hale Moku																							
		L1S1		12	2.5	2.5																0	
		L1S2		8	2.5	0																0	
		L1S3		12	2.5	2.5																0	
		L1S4		12	2.5	2.5																0	
		L1S5		8	2.5	0																0	
		L1S6		8	2.5	0																0	
		L1S7		6	2.5	0																0	
		L1S8		6	2.5	0																0	
		L1S9																					
		Total																				**0**	82
		L2S1		8	2.5	0																0	
		L2S2		8	2.5	0																0	
		L2S3		8	2.5	0																0	
		L2S4		8	2.5	0																0	
		L2S5		8	2.5	0																0	
		L2S6		8	2.5	0																0	
		L2S7		8	2.5	0																0	
		L2S8																					
		Total																				**0**	83
		L3S1		8	2.5	0																0	
		L3S2		8	2.5	0																0	
		L3S3		8	2.5	0																0	
		L3S4		8	2.5	0																0	
		L3S5		8	2.5	0																0	
		L3S6		8	2.5	0																0	
		L3S7		8	2.5	0																0	
		L3S8																					
		Total																				**0**	84
		L4S1		8	2.5	0																0	
		L4S2		8	2.5	0																0	
		L4S3		8	2.5	0																0	
		L4S4		8	2.5	0																0	
		L4S5		8	2.5	0																0	
		L4S6		8	2.5	0																0	
		L4S7		8	2.5	0																0	
		L4S8		8	2.5	0																0	
		L4S9																					
		Total																				**0**	85
Hale Moku Total Water Usage																				**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

21. Hokulani

		L1S1		8	2.5	0	(b) (3) (B)														0	
		L1S2		8	2.5	0															0	
		L1S3		8	2.5	0															0	
		L1S4		8	2.5	0															0	
		L1S5		8	2.5	0															0	
		L1S6		8	2.5	0															0	
		L1S7		8	2.5	0															0	
		L1S8																				
		Total																(b) (3) (B)			**0**	

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		L3S1		8	2.5	0	(b) (3) (B)														0	
		L3S2		6	2.5	0															0	
		L3S3		8	2.5	0															0	
		L3S4		8	2.5	0															0	
		L3S5		6	2.5	0															0	
		L3S6		8	2.5	0															0	
		L3S7																				
		Total																(b) (3) (B)			**0**	

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Hokulani Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
22. Fleet and Industrial Supply Center Pearl																							
		L1S1		16	2.5	2.5															0		
		L1S2		8	2.5	0															0		
		L1S3		8	2.5	0															0		
		L1S4		8	2.5	0															0		
		L1S5		16	2.5	2.5															0		
		L1S6		12	2.5	2.5															0		
		L1S7		6	2.5	0															0		
		L1S8																					
		Total																(b) (3) (B)			**0**		88
		L2S1		12	2.5	2.5															0		
		L2S2		12	2.5	2.5															0		
		L2S3		12	2.5	2.5															0		
		L2S4		8	2.5	0															0		
		L2S5		8	2.5	0															0		
		L2S6		12	2.5	2.5															0		
		L2S7		12	2.5	2.5															0		
		L2S8																					
		Total																(b) (3) (B)			**0**		89
		L3S1		6	2.5	0															0		
		L3S2		6	2.5	0															0		
		L3S3		12	2.5	2.5															0		
		L3S4		6	2.5	0															0		
		L3S5		6	2.5	0															0		
		L3S6		6	2.5	0															0		
		L3S7		8	2.5	0															0		
		L3S8		8	2.5	0															0		
		L3S9																					
		Total																(b) (3) (B)			**0**		90
		L4S1		12	2.5	2.5															0		
		L4S2		12	2.5	2.5															0		
		L4S3		12	2.5	2.5															0		
		L4S4		12	2.5	2.5															0		
		L4S5		12	2.5	2.5															0		
		L4S6		12	2.5	2.5															0		
		L4S7		12	2.5	2.5															0		
		L4S8																					
		Total																(b) (3) (B)			**0**		91
		L5S1		12	2.5	2.5															0		
		L5S2		12	2.5	2.5															0		
		L5S3		12	2.5	2.5															0		
		L5S4		12	2.5	2.5															0		
		L5S5		12	2.5	2.5															0		
		L5S6		12	2.5	2.5															0		
		L5S7		12	2.5	2.5															0		
		L5S8																					
		Total																(b) (3) (B)			**0**		92

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
		L6S1		12	2.5	2.5	(b) (3) (B)														0	
		L6S2		8	2.5	0															0	
		L6S3		8	2.5	0															0	
		L6S4		8	2.5	0															0	
		L6S5		8	2.5	0															0	
		L6S6		8	2.5	0															0	
		L6S7																				
		Total																(b) (3) (B)			**0**	

93

FISC Total Water Usage (b) (3) (B) **Gallons** **0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
23. Sub Base Pearl																							
		L1S1		12	2.5	2.5															0		
		L1S2		8	2.5	0															0		
		L1S3		8	2.5	0															0		
		L1S4		8	2.5	0															0		
		L1S5		8	2.5	0															0		
		L1S6		8	2.5	0															0		
		L1S7		8	2.5	0															0		
		L1S8		6	2.5	0															0		
		L1S9																					
		Total																(b) (3) (B)			**0**		94
		L2S1		12	2.5	2.5															0		
		L2S2		12	2.5	2.5															0		
		L2S3		12	2.5	2.5															0		
		L2S4		12	2.5	2.5															0		
		L2S5		12	2.5	2.5															0		
		L2S6		8	2.5	0															0		
		L2S7																					
		Total																(b) (3) (B)			**0**		95
		L3S1		12	2.5	2.5															0		
		L3S2		12	2.5	2.5															0		
		L3S3		12	2.5	2.5															0		
		L3S4		12	2.5	2.5															0		
		L3S5		12	2.5	2.5															0		
		L3S6		8	2.5	0															0		
		L3S8																					
		Total																(b) (3) (B)			**0**		96
		L4S1		8	2.5	0															0		
		L4S2		8	2.5	0															0		
		L4S3		8	2.5	0															0		
		L4S4		8	2.5	0															0		
		L4S5		8	2.5	0															0		
		L4S6		8	2.5	0															0		
		L4S7		6	2.5	0															0		
		L4S8																					
		Total																(b) (3) (B)			**0**		97
		L5S1		6	2.5	0															0		
		L5S2		12	2.5	2.5															0		
		L5S3		8	2.5	0															0		
		L5S4		6	2.5	0															0		
		L5S5		6	2.5	0															0		
		L5S6		6	2.5	0															0		
		L5S7		8	2.5	0															0		
		L5S8		6	2.5	0															0		
		L5S9																					
		Total																(b) (3) (B)			**0**		98
Sub Base Pearl Total Water Usage																		(b) (3) (B)		**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
24. Naval Station Pearl																							
		L1S1		12	2.5	2.5	(b) (3) (B)														0		
		L1S2		12	2.5	2.5															0		
		L1S3		12	2.5	2.5															0		
		L1S4		6	2.5	0															0		
		L1S5		12	2.5	2.5															0		
		L1S6		6	2.5	0															0		
		L1S7																					
		Total																(b) (3) (B)			**0**		99
		L2S1		12	2.5	2.5	(b) (3) (B)														0		
		L2S2		6	2.5	0															0		
		L2S3		6	2.5	0															0		
		L2S4		12	2.5	2.5															0		
		L2S5		8	2.5	0															0		
		L2S6		8	2.5	0															0		
		L2S7		8	2.5	0															0		
		L2S8																					
		Total																(b) (3) (B)			**0**		100
		L3S1		6	2.5	0	(b) (3) (B)														0		
		L3S2		8	2.5	0															0		
		L3S3		8	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5																					
		Total																(b) (3) (B)			**0**		101
		L4S1		12	2.5	2.5	(b) (3) (B)														0		
		L4S2		8	2.5	0															0		
		L4S3		8	2.5	0															0		
		L4S4		8	2.5	0															0		
		L4S5		8	2.5	0															0		
		L4S6		6	2.5	0															0		
		L4S7		6	2.5	0															0		
		L4S8																					
		Total																(b) (3) (B)			**0**		102
		L5S1		12	2.5	2.5	(b) (3) (B)														0		
		L5S2		10	2.5	2.5															0		
		L5S3		8	2.5	0															0		
		L5S4		6	2.5	0															0		
		L5S5		8	2.5	0															0		
		L5S6		10	2.5	2.5															0		
		L5S7		10	2.5	2.5															0		
		L5S8																					
		Total																(b) (3) (B)			**0**		103

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
		L6S1		8	2.5	0	[redacted]														0	
		L6S2		10	2.5	2.5															0	
		L6S3		10	2.5	2.5															0	
		L6S4		6	2.5	0															0	
		L6S5		6	2.5	0															0	
		L6S6		6	2.5	0															0	
		L6S7		6	2.5	0															0	
		L6S8																				
		Total																(b) (3) (B)			**0**	

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Naval Station Pearl Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
25. Shipyard Pearl																							
		L1S1		12	2.5	2.5																0	
		L1S2		12	2.5	2.5																0	
		L1S3		8	2.5	0																0	
		L1S4		10	2.5	2.5																0	
		L1S5		12	2.5	2.5																0	
		L1S6		10	2.5	2.5																0	
		L1S7		6	2.5	0																0	
		L1S8		8	2.5	0																0	
		L1S9																					
		Total																(b) (3) (B)				**0**	105
		L2S1		8	2.5	0																0	
		L2S2		8	2.5	0																0	
		L2S3		8	2.5	0																0	
		L2S4		8	2.5	0																0	
		L2S5		8	2.5	0																0	
		L2S6		8	2.5	0																0	
		L2S7		12	2.5	2.5																0	
		L2S8																					
		Total																(b) (3) (B)				**0**	106
		L3S1		12	2.5	2.5																0	
		L3S2		8	2.5	0																0	
		L3S3		8	2.5	0																0	
		L3S4		8	2.5	0																0	
		L3S5		6	2.5	0																0	
		L3S6		8	2.5	0																0	
		L3S7		8	2.5	0																0	
		L3S8																					
		Total																(b) (3) (B)				**0**	107
		L4S1		12	2.5	2.5																0	
		L4S2		12	2.5	2.5																0	
		L4S3		12	2.5	2.5																0	
		L4S4		12	2.5	2.5																0	
		L4S5		10	2.5	2.5																0	
		L4S6		10	2.5	2.5																0	
		L4S7		12	2.5	2.5																0	
		L4S8																					
		Total																(b) (3) (B)				**0**	108
		L5S1		12	2.5	2.5																0	
		L5S2		12	2.5	2.5																0	
		L5S3		10	2.5	2.5																0	
		L5S4		12	2.5	2.5																0	
		L5S5		12	2.5	2.5																0	
		L5S6		8	2.5	0																0	
		L5S7		6	2.5	0																0	
		L5S8																					
		Total																(b) (3) (B)				**0**	109

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L6S1		8	2.5	0															0		
		L6S2		8	2.5	0															0		
		L6S3		6	2.5	0															0		
		L6S4		6	2.5	0															0		
		L6S5		12	2.5	2.5															0		
		L6S6		6	2.5	0															0		
		L6S7		8	2.5	0															0		
		L6S8																					
		Total																(b) (3) (B)			**0**		110
		L7S1		8	2.5	0															0		
		L7S2		8	2.5	0															0		
		L7S3		6	2.5	0															0		
		L7S4		6	2.5	0															0		
		L7S5		6	2.5	0															0		
		L7S6		6	2.5	0															0		
		L7S7		10	2.5	2.5															0		
		L7S8																					
		Total																(b) (3) (B)			**0**		111
		L8S1		8	2.5	0															0		
		L8S2		8	2.5	0															0		
		L8S3		6	2.5	0															0		
		L8S4		8	2.5	0															0		
		L8S5		8	2.5	0															0		
		L8S6		6	2.5	0															0		
		L8S7		8	2.5	0															0		
		L8S8		8	2.5	0															0		
		L8S9																					
		Total																(b) (3) (B)			**0**		112
		L9S1		8	2.5	0															0		
		L9S2		8	2.5	0															0		
		L9S3		6	2.5	0															0		
		L9S4		6	2.5	0															0		
		L9S5		6	2.5	0															0		
		L9S6		6	2.5	0															0		
		L9S7		10	2.5	2.5															0		
		L9S8																					
		Total																(b) (3) (B)			**0**		113
		L10S1		8	2.5	0															0		
		L10S2		8	2.5	0															0		
		L10S3		8	2.5	0															0		
		L10S4		8	2.5	0															0		
		L10S5		8	2.5	0															0		
		L10S6		8	2.5	0															0		
		L10S7		8	2.5	0															0		
		L10S8																					
		Total																(b) (3) (B)			**0**		114

Joint Base Pearl Harbor Hickam
Pearl Harbor Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks	
		L11S1		8	2.5	0															0		
		L11S2		10	2.5	2.5															0		
		L11S3		10	2.5	2.5															0		
		L11S4		10	2.5	2.5															0		
		L11S5		12	2.5	2.5															0		
		L11S6		6	2.5	0															0		
		L11S7		10	2.5	2.5															0		
		L11S8																					
		Total																(b) (3) (B)			**0**		115
		L12S1		8	2.5	0															0		
		L12S2		6	2.5	0															0		
		L12S3		12	2.5	2.5															0		
		L12S4		12	2.5	2.5															0		
		L12S5		6	2.5	0															0		
		L12S6		6	2.5	0															0		
		L12S7		6	2.5	0															0		
		L12S8																					
		Total																(b) (3) (B)			**0**		116
Shipyard Pearl Total Water Usage																		(b) (3) (B)	**Gallons**		**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks

26. Hospital Point

		L1S1		6	2.5	0	(b) (3) (B)														0	
		L1S2		6	2.5	0															0	
		L1S3		6	2.5	0															0	
		L1S4		6	2.5	0															0	
		L1S5		6	2.5	0															0	
		L1S6		6	2.5	0															0	
		L1S7		6	2.5	0															0	
		L1S8																				
		Total																(b) (3) (B)			**0**	

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		L2S1		6	2.5	0	(b) (3) (B)														0	
		L2S2		6	2.5	0															0	
		L2S3		6	2.5	0															0	
		L2S4		6	2.5	0															0	
		L2S5		6	2.5	0															0	
		L2S6		6	2.5	0															0	
		L2S7																				
		Total																(b) (3) (B)			**0**	

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Hospital Point Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1 volume	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Remarks
27. Ohana Nui																						
		L1S1		6	2.5	0															0	
		L1S2		6	2.5	0															0	
		L1S3		12	2.5	2.5															0	
		L1S4		8	2.5	0															0	
		L1S5		8	2.5	0															0	
		L1S6		8	2.5	0															0	
		L1S7		6	2.5	0															0	
		L1S8		6	2.5	0															0	
		L1S9																				
		Total																			**0**	

(b) (3) (B)

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Ohana Nui Total Water Usage	(b) (3) (B)	**Gallons**	**0** **Gallons**
Pearl Harbor All Zones Total Water Usage	(b) (3) (B)	**Gallons**	**0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Unidirectional Flushing Log																							
Hickam Zone 4																							
		L1S1		12	2.5	2.5															0		
		L1S2		6	2.5																0		
		L1S3		12	2.5	2.5															0		
		L1S4		8	2.5																0		
		L1S5		6	2.5																0		
		L1S6		8	2.5																0		
		L1S7		8	2.5																0		
		L1S8																					
		Total																(b) (3) (B)			**0**		1
		L2S1		8	2.5																0		
		L2S2		8	2.5																0		
		L2S3		8	2.5																0		
		L2S4		6	2.5																0		
		L2S5		6	2.5																0		
		L2S6		6	2.5																0		
		L2S7		8	2.5																0		
		L2S8		8	2.5																0		
		L2S9																					
		Total																(b) (3) (B)			**0**		2
		L3S1		8	2.5																0		
		L3S2		6	2.5																0		
		L3S3		8	2.5																0		
		L3S4		8	2.5																0		
		L3S5		8	2.5																0		
		L3S6		6	2.5																0		
		L3S7		6	2.5																0		
		L3S8																					
		Total																(b) (3) (B)			**0**		3
		L4S1		8	2.5																0		
		L4S2		8	2.5																0		
		L4S3		8	2.5																0		
		L4S4		8	2.5																0		
		L4S5		8	2.5																0		
		L4S6		8	2.5	0															0		
		L4S7																					
		Total																(b) (3) (B)			**0**		4
Hickam Zone 4 Total Water Usage																		(b) (3) (B)		**Gallons**	**0**	**Gallons**	

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 5																							
		L1S1		8	2.5		(b) (3) (B)															0	
		L1S2		8	2.5																	0	
		L1S3		8	2.5																	0	
		L1S4		8	2.5																	0	
		L1S5		8	2.5																	0	
		L1S6		8	2.5																	0	
		L1S7																					
		Total																(b) (3) (B)				**0**	5
		L2S1		8	2.5		(b) (3) (B)															0	
		L2S2		8	2.5																	0	
		L2S3		6	2.5																	0	
		L2S4		6	2.5																	0	
		L2S5		6	2.5																	0	
		L2S6		8	2.5																	0	
		L2S7		8	2.5																	0	
		L2S8		6	2.5																	0	
		L2S9																					
		Total																(b) (3) (B)				**0**	6
		L3S1		8	2.5		(b) (3) (B)															0	
		L3S2		8	2.5																	0	
		L3S3		8	2.5																	0	
		L3S4		8	2.5																	0	
		L3S5		8	2.5																	0	
		L3S6		8	2.5																	0	
		L3S7																					
		Total																(b) (3) (B)				**0**	7
		L4S1		8	2.5		(b) (3) (B)															0	
		L4S2		8	2.5																	0	
		L4S3		8	2.5																	0	
		L4S4		6	2.5																	0	
		L4S5		6	2.5																	0	
		L4S6		8	2.5																	0	
		L4S7		8	2.5																	0	
		L4S8																					
		Total																(b) (3) (B)				0	8
		L5S1		8	2.5		(b) (3) (B)															0	
		L5S2		8	2.5																	0	
		L5S3		8	2.5																	0	
		L5S4		8	2.5																	0	
		L5S5		8	2.5																	0	
		L5S6		8	2.5																	0	
		L5S7		6	2.5																	0	
		L5S8																					
		Total																(b) (3) (B)				**0**	9

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks
		L6S1		8	2.5		(b) (3) (B)														0	
		L6S2		8	2.5																0	
		L6S3		6	2.5																0	
		L6S4		6	2.5																0	
		L6S5		6	2.5																0	
		L6S6		6	2.5																0	
		L6S7		6	2.5																0	
		L6S8																				
		Total																(b) (3) (B)			**0**	

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Hickam Zone 5 Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 6																							
		L1S1		12	2.5	2.5	(b) (3) (B)														0		
		L1S2		12	2.5	2.5															0		
		L1S3		12	2.5	2.5															0		
		L1S4		8	2.5																0		
		L1S5		6	2.5																0		
		L1S6		6	2.5																0		
		L1S7		6	2.5																0		
		L1S8																					
		Total																(b) (3) (B)			**0**		11
		L2S1		8	2.5		(b) (3) (B)														0		
		L2S2		8	2.5																0		
		L2S3		8	2.5																0		
		L2S4		8	2.5																0		
		L2S5		6	2.5																0		
		L2S6		6	2.5																0		
		L2S7		6	2.5																0		
		L2S8																					
		Total																(b) (3) (B)			**0**		12
		L3S1		6	2.5		(b) (3) (B)														0		
		L3S2		6	2.5																0		
		L3S3		6	2.5																0		
		L3S4		6	2.5																0		
		L3S5		8	2.5																0		
		L3S6		8	2.5																0		
		L3S7		6	2.5																0		
		L3S8																					
		Total																(b) (3) (B)			**0**		13
		L4S1		8	2.5		(b) (3) (B)														0		
		L4S2		8	2.5																0		
		L4S3		8	2.5																0		
		L4S4		8	2.5																0		
		L4S5		8	2.5																0		
		L4S6		8	2.5																0		
		L4S7		8	2.5																0		
		L4S8		8	2.5																0		
		L4S9																					
		Total																(b) (3) (B)			**0**		14

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
		L5S1		6	2.5		(b) (3) (B)														0		
		L5S2		6	2.5																0		
		L5S3		8	2.5																0		
		L5S4		8	2.5																0		
		L5S5		6	2.5																0		
		L5S6		6	2.5																0		
		L5S7		8	2.5																0		
		L5S8		8	2.5																0		
		L5S9													0.00								
		Total																(b) (3) (B)			**0**		15
		L6S1		8	2.5		(b) (3) (B)														0		
		L6S2		8	2.5																0		
		L6S3		8	2.5																0		
		L6S4		6	2.5																0		
		L6S5		6	2.5																0		
		L6S6		6	2.5																0		
		L6S7		6	2.5																0		
		L6S8		6	2.5																0		
		L6S9													0.00								
		Total																(b) (3) (B)			**0**		16
		L7S1		8	2.5		(b) (3) (B)														0		
		L7S2		8	2.5																0		
		L7S3		8	2.5																0		
		L7S4		8	2.5																0		
		L7S5		8	2.5																0		
		L7S6		8	2.5																0		
		L7S7		8	2.5																0		
		L7S8		6	2.5																0		
		L7S9													0.00								
		Total																(b) (3) (B)			**0**		17
		L8S1		8	2.5		(b) (3) (B)														0		
		L8S2		8	2.5																0		
		L8S3		8	2.5																0		
		L8S4		8	2.5																0		
		L8S5		8	2.5																0		
		L8S6		8	2.5																0		
		L8S7		8	2.5																0		
		L8S8		6	2.5																0		
		L8S9													0.00								
		Total																(b) (3) (B)			**0**		18

Hickam Zone 6 Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 7																							
		L1S1		12	2.5	2.5	(b) (3) (B)														0		
		L1S2		8	2.5	0															0		
		L1S3		8	2.5	0															0		
		L1S4		8	2.5	0															0		
		L1S5		8	2.5	0															0		
		L1S6		8	2.5	0															0		
		L1S7		8	2.5	0															0		
		L1S8		6	2.5	0															0		
		L1S9																					
		Total																(b) (3) (B)			**0**		19
		L2S1		12	2.5	2.5	(b) (3) (B)														0		
		L2S2		8	2.5	0															0		
		L2S3		8	2.5	0															0		
		L2S4		8	2.5	0															0		
		L2S5		8	2.5	0															0		
		L2S6		8	2.5	0															0		
		L2S7		6	2.5	0															0		
		L2S8																					
		Total																(b) (3) (B)			**0**		20

Hickam Zone 7 Total Water Usage (b) (3) (B) **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 8																							
		L1S1		8	2.5	0	[redacted]														0		
		L1S2		8	2.5																0		
		L1S3		8	2.5																0		
		L1S4		8	2.5																0		
		L1S5		8	2.5																0		
		L1S6		8	2.5																0		
		L1S7		8	2.5																0		
		L1S8		8	2.5																0		
		L1S9																					
		Total																			**0**		21
		L2S1		8	2.5		[redacted]														0		
		L2S2		6	2.5																0		
		L2S3		8	2.5																0		
		L2S4		8	2.5																0		
		L2S5		6	2.5																0		
		L2S6		8	2.5																0		
		L2S7		8	2.5																0		
		L2S8		8	2.5																0		
		L2S9																					
		Total																			**0**		22
		L3S1		8	2.5		[redacted]														0		
		L3S2		8	2.5																0		
		L3S3		8	2.5																0		
		L3S4		8	2.5																0		
		L3S5		8	2.5																0		
		L3S6		6	2.5																0		
		L3S7		6	2.5																0		
		L3S8		8	2.5																0		
		L3S9																					
		Total																			**0**		23
		L4S1		12	2.5	2.5	[redacted]														0		
		L4S2		12	2.5	2.5															0		
		L4S3		12	2.5	2.5															0		
		L4S4		12	2.5	2.5															0		
		L4S5		8	2.5	0															0		
		L4S6		6	2.5	0															0		
		L4S7		6	2.5	0															0		
		L4S8		6	2.5	0															0		
		L4S9																					
		Total																			**0**		24

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks
		L5S1		12	2.5	2.5	(b) (3) (B)														0	
		L5S2		6	2.5																0	
		L5S3		8	2.5																0	
		L5S4		6	2.5																0	
		L5S5		8	2.5																0	
		L5S6		6	2.5																0	
		L5S7		6	2.5																0	
		L5S8		6	2.5																0	
		L5S9		6	2.5																0	
		L5S10		6	2.5	0															0	
		L5S11																				
		Total																(b) (3) (B)			**0**	

25

Hickam Zone 8 Total Water Usage (b) (3) (B) **Gallons** **0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 2																							
		L1S1		12	2.5	2.5	(b) (3) (B)														0		
		L1S2		12	2.5	2.5															0		
		L1S3		12	2.5	2.5															0		
		L1S4		12	2.5	2.5															0		
		L1S5		6	2.5	0															0		
		L1S6		6	2.5	0															0		
		L1S7		6	2.5	0															0		
		L1S8		8	2.5	2.															0		
		L1S9																(b) (3) (B)					
		Total																			**0**		26
		L2S1		12	2.5	2.5	(b) (3) (B)														0		
		L2S2		12	2.5	2.5															0		
		L2S3		8	2.5	0															0		
		L2S4		10	2.5	2.5															0		
		L2S5		10	2.5	2.5															0		
		L2S6		10	2.5	2.5															0		
		L2S7		10	2.5	2.5															0		
		L2S8		6	2.5	0															0		
		L2S9																(b) (3) (B)					
		Total																			**0**		27
		L3S1		6	2.5		(b) (3) (B)														0		
		L3S2		6	2.5																0		
		L3S3		6	2.5																0		
		L3S4		8	2.5																0		
		L3S5		8	2.5																0		
		L3S6		6	2.5																0		
		L3S7		6	2.5																0		
		L3S8																(b) (3) (B)					
		Total																			**0**		28
		L4S1		8	2.5		(b) (3) (B)														0		
		L4S2		8	2.5																0		
		L4S3		6	2.5																0		
		L4S4		6	2.5																0		
		L4S5		6	2.5																0		
		L4S6		6	2.5																0		
		L4S7		6	2.5																0		
		L4S8		6	2.5																0		
		L4S9		6	2.5																0		
		L4S10																(b) (3) (B)					
		Total																			**0**		29

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks
		L5S1		12	2.5	2.5	(b) (3) (B)														0	
		L5S2		12	2.5	2.5															0	
		L5S3		6	2.5																0	
		L5S4		8	2.5																0	
		L5S5		8	2.5																0	
		L5S6		8	2.5																0	
		L5S7		6	2.5																0	
		L5S8		6	2.5																0	
		L5S9																				
		Total																(b) (3) (B)			**0**	

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Hickam Zone 2 Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 1																							
		L1S1		8	2.5		(b) (3) (B)														0		
		L1S2		8	2.5																0		
		L1S3		8	2.5																0		
		L1S4		8	2.5																0		
		L1S5		8	2.5																0		
		L1S6		8	2.5																0		
		L1S7		8	2.5																0		
		L1S8		8	2.5																0		
		L1S9																					
		Total																(b) (3) (B)			**0**		31
		L2S1		8	2.5		(b) (3) (B)														0		
		L2S2		8	2.5																0		
		L2S3		8	2.5																0		
		L2S4		8	2.5																0		
		L2S5		8	2.5																0		
		L2S6		8	2.5																0		
		L2S7		8	2.5																0		
		L2S8		8	2.5																0		
		L2S9																					
		Total																(b) (3) (B)			**0**		32
		L3S1		8	2.5		(b) (3) (B)														0		
		L3S2		8	2.5																0		
		L3S3		8	2.5																0		
		L3S4		8	2.5																0		
		L3S5		8	2.5																0		
		L3S6		8	2.5																0		
		L3S7		8	2.5																0		
		L3S8		8	2.5																0		
		L3S9																					
		Total																(b) (3) (B)			**0**		33
Hickam Zone 1 Total Water Usage																		(b) (3) (B)	**Gallons**		**0**	**Gallons**	

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 12																							
		L1S1		12	2.5	2.5																0	
		L1S2		12	2.5	2.5																0	
		L1S3		8	2.5																	0	
		L1S4		8	2.5																	0	
		L1S5		8	2.5																	0	
		L1S6		8	2.5																	0	
		L1S7		6	2.5																	0	
		L1S8		8	2.5																	0	
		L1S9																					
		Total																(b) (3) (B)				**0**	34
		L2S1		8	2.5	0																0	
		L2S2		8	2.5																	0	
		L2S3		8	2.5																	0	
		L2S4		8	2.5																	0	
		L2S5		8	2.5																	0	
		L2S6		8	2.5																	0	
		L2S7		8	2.5																	0	
		L2S8																					
		Total																(b) (3) (B)				**0**	35

Hickam Zone 12 Total Water Usage (b) (3) (B) **Gallons** **0** **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 9																							
		L1S1		8	2.5		(b) (3) (B)														0		
		L1S2		8	2.5																0		
		L1S3		8	2.5																0		
		L1S4		8	2.5																0		
		L1S5		8	2.5																0		
		L1S6		8	2.5																0		
		L1S7		8	2.5																0		
		L1S8		8	2.5																0		
		L1S9																					
		Total																(b) (3) (B)			**0**		36
		L2S1		8	2.5		(b) (3) (B)														0		
		L2S2		8	2.5																0		
		L2S3		6	2.5																0		
		L2S4		6	2.5																0		
		L2S5		8	2.5																0		
		L2S6		6	2.5																0		
		L2S7		8	2.5																0		
		L2S8		8	2.5																0		
		L2S9																					
		Total																(b) (3) (B)			**0**		37
		L3S1		8	2.5		(b) (3) (B)														0		
		L3S2		8	2.5																0		
		L3S3		6	2.5																0		
		L3S4		8	2.5																0		
		L3S5		8	2.5																0		
		L3S6		8	2.5																0		
		L3S7		8	2.5																0		
		L3S8		8	2.5																0		
		L3S9																					
		Total																(b) (3) (B)			**0**		38
		L4S1		8	2.5	0	(b) (3) (B)														0		
		L4S2		8	2.5																0		
		L4S3		8	2.5																0		
		L4S4		6	2.5																0		
		L4S5		8	2.5																0		
		L4S6		6	2.5																0		
		L4S7		8	2.5																0		
		L4S8		8	2.5																0		
		L4S9																					
		Total																(b) (3) (B)			**0**		39

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
		L5S1		8	2.5		(b) (3) (B)														0		
		L5S2		8	2.5																0		
		L5S3		8	2.5																0		
		L5S4		6	2.5																0		
		L5S5		6	2.5																0		
		L5S6		8	2.5																0		
		L5S7		8	2.5																0		
		L5S8		6	2.5																0		
		L5S9																					
		Total																(b) (3) (B)			**0**		40
		L6S1		8	2.5		(b) (3) (B)														0		
		L6S2		6	2.5																0		
		L6S3		6	2.5																0		
		L6S4		8	2.5																0		
		L6S5		8	2.5																0		
		L6S6		8	2.5																0		
		L6S7		8	2.5																0		
		L6S8		6	2.5																0		
		L6S9																					
		Total																(b) (3) (B)			**0**		41
		L7S1		8	2.5		(b) (3) (B)														0		
		L7S2		8	2.5																0		
		L7S3		8	2.5																0		
		L7S4		8	2.5																0		
		L7S5		8	2.5																0		
		L7S6		8	2.5																0		
		L7S7		6	2.5																0		
		L7S8		6	2.5																0		
		L7S9																					
		Total																(b) (3) (B)			**0**		42
		L8S1		8	2.5		(b) (3) (B)														0		
		L8S2		8	2.5																0		
		L8S3		8	2.5																0		
		L8S4		8	2.5																0		
		L8S5		8	2.5																0		
		L8S6		6	2.5																0		
		L8S7		6	2.5																0		
		L8S8		8	2.5																0		
		L8S9																					
		Total																(b) (3) (B)			**0**		43

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
		L9S1		8	2.5																0		
		L9S2		8	2.5																0		
		L9S3		8	2.5																0		
		L9S4		8	2.5																0		
		L9S5		8	2.5																0		
		L9S6		8	2.5																0		
		L9S7		8	2.5																0		
		L9S8		8	2.5	0															0		
		L9S9																					
		Total																(b) (3) (B)			**0**		44
		L10S1		12	2.5	2.5															0		
		L10S2		12	2.5	2.5															0		
		L10S3		12	2.5	2.5															0		
		L10S4		8	2.5																0		
		L10S5		8	2.5																0		
		L10S6		12	2.5	2.5															0		
		L10S7		12	2.5	2.5															0		
		L10S8		12	2.5	2.5															0		
		L10S9																					
		Total																(b) (3) (B)			**0**		45

(b) (3) (B)

Hickam Zone 9 Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 3																							
		L1S1		12	2.5	2.5															0		
		L1S2		8	2.5																0		
		L1S3		8	2.5																0		
		L1S4		8	2.5																0		
		L1S5		8	2.5																0		
		L1S6		8	2.5																0		
		L1S7		8	2.5																0		
		L1S8		6	2.5																0		
		L1S9																					
		Total																(b) (3) (B)			**0**		46
		L2S1		12	2.5	2.5															0		
		L2S2		8	2.5																0		
		L2S3		6	2.5																0		
		L2S4		12	2.5	2.5															0		
		L2S5		6	2.5																0		
		L2S6		6	2.5																0		
		L2S7		12	2.5	2.5															0		
		L2S8		10	2.5	2.5															0		
		L2S9																					
		Total																(b) (3) (B)			**0**		47
		L3S1		6	2.5	0															0		
		L3S2		6	2.5	0															0		
		L3S3		6	2.5	0															0		
		L3S4		8	2.5	0															0		
		L3S5		8	2.5	0															0		
		L3S6		8	2.5	0															0		
		L3S7		8	2.5	0															0		
		L3S8		6	2.5	0															0		
		L3S9		6	2.5	0															0		
		L3S10																					
		Total																(b) (3) (B)			**0**		48
		L4S1		12	2.5	2.5															0		
		L4S2		12	2.5	2.5															0		
		L4S3		8	2.5																0		
		L4S4		8	2.5																0		
		L4S5		8	2.5																0		
		L4S6		8	2.5																0		
		L4S7		6	2.5																0		
		L4S8		8	2.5																0		
		L4S9		6	2.5																0		
		L4S10																					
		Total																(b) (3) (B)			**0**		49

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
		L5S1		12	2.5	2.5															0		
		L5S2		12	2.5	2.5															0		
		L5S3		8	2.5																0		
		L5S4		8	2.5																0		
		L5S5		8	2.5																0		
		L5S6		6	2.5																0		
		L5S7		6	2.5																0		
		L5S8		6	2.5																0		
		L5S9		6	2.5																0		
		L5S10																					
		Total																(b) (3) (B)			**0**		50
		L6S1		12	2.5	2.5															0		
		L6S2		12	2.5	2.5															0		
		L6S3		12	2.5	2.5															0		
		L6S4		8	2.5	0															0		
		L6S5		12	2.5	2.5															0		
		L6S6		12	2.5	2.5															0		
		L6S7		12	2.5	2.5															0		
		L6S8		8	2.5	0															0		
		L6S9		6	2.5	0															0		
		L6S10																					
		Total																(b) (3) (B)			**0**		51
		L7S1		4	2.5																0		
		L7S2		8	2.5																0		
		L7S3		8	2.5																0		
		L7S4		8	2.5																0		
		L7S5		6	2.5																0		
		L7S6		8	2.5																0		
		L7S7		8	2.5																0		
		L7S8		8	2.5																0		
		L7S9		8	2.5																0		
		L7S10																					
		Total																(b) (3) (B)			**0**		52
		L8S1		8	2.5	0															0		
		L8S2		8	2.5																0		
		L8S3		6	2.5																0		
		L8S4		6	2.5																0		
		L8S5		6	2.5																0		
		L8S6		6	2.5																0		
		L8S7		6	2.5																0		
		L8S8		6	2.5																0		
		L8S9		6	2.5																0		
		L8S10																					
		Total																(b) (3) (B)			**0**		53

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks
		L9S1		8	2.5		(b) (3) (B)														0	
		L9S2		8	2.5																0	
		L9S3		8	2.5																0	
		L9S4		8	2.5																0	
		L9S5		8	2.5																0	
		L9S6		8	2.5																0	
		L9S7		6	2.5																0	
		L9S8		6	2.5																0	
		L9S9		6	2.5																0	
		L9S10																				
		Total																(b) (3) (B)			**0**	

54

Hickam Zone 3 Total Water Usage (b) (3) (B) **Gallons**

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
Hickam Zone 10																							
		L1S1		12	2.5	2.5	(b) (3) (B)														0		
		L1S2		12	2.5	2.5															0		
		L1S3		6	2.5																0		
		L1S4		12	2.5	2.5															0		
		L1S5		12	2.5	2.5															0		
		L1S6		12	2.5	2.5															0		
		L1S7		8	2.5	0															0		
		L1S8		8	2.5	0															0		
		L1S9		6	2.5	0															0		
		L1S10																					
		Total																(b) (3) (B)			**0**		55
		L2S1		12	2.5	2.5	(b) (3) (B)														0		
		L2S2		10	2.5	2.5															0		
		L2S3		10	2.5	2.5															0		
		L2S4		10	2.5	2.5															0		
		L2S5		10	2.5	2.5															0		
		L2S6		10	2.5	2.5															0		
		L2S7		6	2.5																0		
		L2S8																					
		Total																(b) (3) (B)			**0**		56
		L3S1		8	2.5		(b) (3) (B)														0		
		L3S2		10	2.5	0															0		
		L3S3		8	2.5																0		
		L3S4		8	2.5																0		
		L3S5		8	2.5																0		
		L3S6		6	2.5																0		
		L3S7		6	2.5																0		
		L3S8		6	2.5																0		
		L3S9		6	2.5																0		
		L3S10																					
		Total																(b) (3) (B)			**0**		57
		L4S1		12	2.5	2.5	(b) (3) (B)														0		
		L4S2		12	2.5	2.5															0		
		L4S3		12	2.5	2.5															0		
		L4S4		12	2.5	2.5															0		
		L4S5		12	2.5	2.5															0		
		L4S6		12	2.5	2.5															0		
		L4S7		12	2.5	2.5															0		
		L4S8		6	2.5																0		
		L4S9		6	2.5																0		
		L4S10																					
		Total																(b) (3) (B)			**0**		58

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks	
		L5S1		6	2.5																0		
		L5S2		6	2.5																0		
		L5S3		12	2.5	2.5															0		
		L5S4		6	2.5																0		
		L5S5		12	2.5	2.5															0		
		L5S6		12	2.5	2.5															0		
		L5S7		8	2.5	0															0		
		L5S8		8	2.5	0															0		
		L5S9		8	2.5	0															0		
		L5S10																					
		Total																(b) (3) (B)			**0**		59
		L6S1		8	2.5																0		
		L6S2		8	2.5																0		
		L6S3		6	2.5																0		
		L6S4		6	2.5																0		
		L6S5		6	2.5																0		
		L6S6		6	2.5																0		
		L6S7		8	2.5																0		
		L6S8		8	2.5																0		
		L6S9		6	2.5																0		
		L6S10																					
		Total																(b) (3) (B)			**0**		60
		L7S1		12	2.5	2.5															0		
		L7S2		8	2.5																0		
		L7S3		8	2.5																0		
		L7S4		8	2.5																0		
		L7S5		6	2.5																0		
		L7S6		8	2.5																0		
		L7S7		12	2.5	2.5															0		
		L7S8		12	2.5	2.5															0		
		L7S9		8	2.5																0		
		L7S10																					
		Total																(b) (3) (B)			**0**		61
Hickam Zone 10 Total Water Usage																		(b) (3) (B)	**Gallons**		**0**	**Gallons**	

Joint Base Pearl Harbor-Hickam
Hickam Unidirectional Flushing log

Date	Time	Loop# / Step#	Hyd #	Pipe Dia	Orifice Dia 1	Orifice Dia 2	Static Pres (PSI)	Resid Pres (PSI)	Pitot 1 Pres (PSI)	Pitot 2 Pres (PSI)	Hyd Coef (0.7-1.0)	Flushing Discharge (gpm)	Flushing Vel (ft/sec)	Pipe length (ft)	Number of gallons in 1 length	Min Time to flush 1	Time to flush 5 volumes , mn	Total Number of Gallons used	Turbidity	Actual Time to clear (min)	Actual Number of Gallons used	Rermarks
Hickam Zone 11																						
		L1S1		12	2.5	2.5															0	
		L1S2		12	2.5	2.5															0	
		L1S3		12	2.5	2.5															0	
		L1S4		12	2.5	2.5															0	
		L1S5		8	2.5																0	
		L1S6		8	2.5																0	
		L1S7		8	2.5																0	
		L1S8		8	2.5	0															0	
		L1S9																				
		Total																(b) (3) (B)			**0**	

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		L2S1		8	2.5																0	
		L2S2		8	2.5																0	
		L2S3		6	2.5																0	
		L2S4		6	2.5																0	
		L2S5		6	2.5																0	
		L2S6		6	2.5																0	
		L2S7		6	2.5																0	
		L2S8		6	2.5																0	
		L2S9																				
		Total																(b) (3) (B)			**0**	

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Hickam Zone 11 Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**
Hickam All Zones Total Water Usage	(b) (3) (B)	**Gallons**	**0**	**Gallons**

APPENDIX D

Public Notification/Feedback Examples

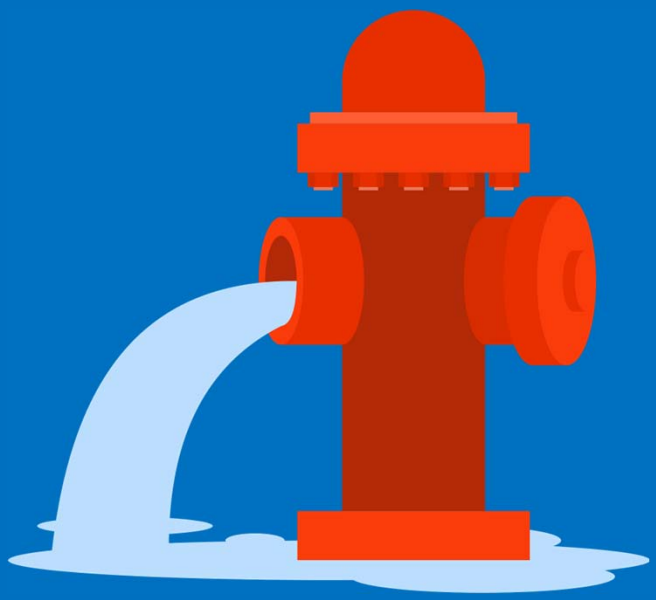
(13 PAGES)

Customer Notice

HYDRANT FLUSHING

Month xxth –xxth

XX:00 a.m. – XX:00 p.m.



You may experience color discoloration in the water. If you do, please run water for several minutes until the water clears. There may also be a slight drop in water pressure.

We apologize for any inconvenience!

NAVFAC
Naval Facilities Engineering Systems Command

Customer Notice

HYDRANT FLUSHING

Month xxth -xxth

XX:00 a.m. – XX:00 p.m.

The purpose of flushing is to remove sediment build up in the mains and to verify the safe operation of hydrants and valves

You may experience color discoloration in the water. If you do, please run water for several minutes until the water clears. There may also be a slight drop in water pressure.

We apologize for any inconvenience!

NAVFAC
Naval Facilities Engineering Systems Command

HYDRANT FLUSHING

Customer Notice

Month X-X **X:XX am –X:XX pm**

The purpose of flushing is to remove sediment build up in the mains and to verify the safe operation of hydrants and valves

You may experience color discoloration in the water. If you do, please run water for several minutes until the water clears. There may also be a slight drop in water pressure.

We apologize for any inconvenience!

NAVFAC

Dear Valued Customer,

PLACE POSTAGE HERE

We recently flushed the water system in your area to improve water quality. To help us better serve you, please answer the following questions and return this postcard in the mail.

	YES	NO
1. Did you receive any notification about the recent water system flushing?	○	○
2. If you received a notification, did you find it helpful?	○	○
3. Did you experience any discolored or cloudy water in the last three weeks? If yes, how long did it last?_____	○	○
4. Did you notice any unusual taste or odor in your water in the last three weeks? If yes, how long did it last?_____	○	○

5. Do you have any other comments or concerns regarding the recent flushing activity?

_____

_____

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Published on *Rock Hall Maryland* (https://www.rockhallmd.com)

Everything you need to know about Water Main Flushing (Hydrants)

Everything You Need to Know About Water Main Flushing

Chances are that at some point in early spring, you have noticed fire hydrants being flushed and releasing large amounts of water into the streets. While it may appear that hundreds of gallons are going to waste, there are actually several benefits to this hydrant flushing process. Water main flushing is an important preventative maintenance activity that:

verifies proper operation of the hydrant

evaluates the available flow to the hydrant

allows utilities to deliver the highest quality water possible to their customers

removes mineral and sediment build up from the water mains

Mineral and Sediment Build Up

Throughout the course of several months or a year, loose sediment and mineral deposits may slowly build up inside of the water mains resulting in discolored water and reduced capacity. Flushing the water mains can remove the sediment and mineral build up, and improve the color, odor, and taste of the water if it has been problematic. Unidirectional flushing at the minimum required velocity will improve the carrying capacity of the mains.

High-Quality Water

Over time, water settles, ages, and is affected by biofilm (a thin layer of microorganisms) that grows on the inside of the distribution piping. Each of these factors affects the quality and taste of the water, so it is important to flush the water out of the mains and hydrants regularly. Flushing can remove water from areas of the distribution system that have low water use, since the older water may no longer have the desired chlorine residual.

When will a hydrant near me be flushed?

Hydrant flushing normally takes place at the start of spring. Your Public Water Supplier (PWS) should notify you of what streets will be undergoing flushing and when.

What can I do to prepare for flushing?

Prior to local hydrants being flushed, you may want to obtain water (in pitchers prior to flushing) for your everyday use including drinking, cooking, etc.

When the flushing is taking place, water quality may temporarily be reduced. Using water for tasks such as dishwashing, laundry, or showering may result in the discoloration/staining of your clothes or household items. Plan ahead and be sure your laundry and dishes are done before the flushing process begins!

When will my water be back to normal?

Once the hydrants in your area have completed their flushing, it will not be long until your water is ready for normal use again. In most cases, water should run clear with just a few minutes of faucet flow. Turn your faucets on cold and let the water run for 5 minutes or so. If you are still seeing discolored water or sediments in the water, continue running cold water on all your faucets until it is clear. Should your water still be discolored after several hours, please contact your water supplier.

Is water main/hydrant flushing a waste of water?

Although you will see water flowing for up to an hour, rest assured that most of the water that was flushed will return to a river, stream, or aquifer. Flushing is a necessary process to help keep our water mains clean and clear of sediment, allowing your public water supplier to provide excellent water quality, and increased pressure and flow.

FLUSHING IS AN ESSENTIAL PART OF OUR ANNUAL SYSTEM MAINTENANCE PROGRAM Each year, Pennsylvania American Water flushes the pipes in its water distribution system. This is an essential part of our system maintenance program, which helps us to continue to provide you with high-quality water service. Although we've been carrying out this maintenance program for decades, we do receive questions from time to time about why we flush.

WHY FLUSHING IS IMPORTANT Flushing our system helps to clean out any buildup of mineral deposits and sediment inside the pipes. These harmless deposits can occur when there is a reduced water demand. We also flush our hydrants to make sure they are operational and to check fire flows in our system.

HOW WE FLUSH OUR PIPELINES Flushing involves simultaneously opening fire hydrants in a specific area to increase water flows. When crews are flushing hydrants in your area, you may notice a drop in water pressure or discolored water, which may occur because the sediment in water mains get stirred up when the fire hydrants are used and when the flow of water in mains changes. This is normal. If this happens, it is not harmful. Simply let your water run until it is clear.

WHAT TO DO TO PREPARE FOR FLUSHING IN YOUR COMMUNITY • Draw water for cooking ahead of time. • Store a large bottle of water in the refrigerator for drinking. • Check for discolored

water before using the washing machine or dishwasher. Note: If your laundry becomes stained,

DO NOT USE BLEACH AND DO NOT PUT YOUR LAUNDRY IN THE DRYER. Rewash clothes immediately using more detergent or a heavy-duty detergent and add a rust remover. Most rust removers can also be used on stained fixtures.

Robert Resele Town Manager

21774 Rock Hall Ave.

P.O. Box 367

Cell – 443-480-2813

Office – 410-639-7611 Ext 103

Rock Hall, Maryland 21661

Attachment	Size
flushing_information_1.pdf	287.17 KB

Source URL:https://www.rockhallmd.com/town-hall/news/everything-you-need-know-about-water-main-flushing-hydrants

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PRESS RELEASE
FIRE HYDRANT FLUSHING

The Waynesboro Water Department will begin flushing all fire hydrants in the Borough's water service area on Monday, April 1, 2024. This program is a necessary distribution system maintenance function in which sediment is expelled from the distribution system by opening fire hydrants and flowing them until the water appears clear. The flushing program also allows Water Department personnel to assess the proper operation of the fire hydrants.

Some customers in the water service area being flushed may experience brief water discoloration and slight pressure fluctuations. Borough personnel will do everything in their power to keep these conditions to a minimum.

THE HYDRANT FLUSHING SCHEDULE IS AS FOLLOWS:

Day 1 (Monday, April 1)	Country Club Estates, Woodcrest and Old Forge Road areas
Day 2 (Tuesday, April 2)	Country Club Road and Bayer Drive areas
Day 3 (Wednesday, April 3)	Bayer Drive, Rinehart Drive and Gehr Road
Day 4 (Thursday, April 4)	Antietam Commons and N. Welty Road
Day 5 (Friday, April 5)	S. Welty Road, Barnett Avenue, Geiser Avenue, Strickler Avenue, N. Landis Avenue and N. Oller Avenue
Day 6 (Monday, April 8)	S. Oller Avenue, Twin Hill Drive, Old Mill Road, Monta Vista Drive and Eastland Hills
Day 7 (Tuesday, April 9)	Eastland Hills, Wynncrest Drive, area around Hospital, Hawbaker Avenue and Northfield Avenue
Day 8 (Wednesday, April 10)	N. Broad Street, N. Church Street and Sheffield Manor
Day 9 (Thursday, April 11)	Stottlemyer Road, Elder Avenue, N. Potomac Street, Wallace Court and Garfield Street
Day 10 (Friday, April 12)	Brown Street, N. Grant Street, Route 316, Franklin Street and C.V. Avenue
Day 11 (Monday, April 15)	Tritle Avenue, Frick Avenue and Prices Church Road

Day 12 (Tuesday, April 16)	E. Main Street, E. Second Street and E. Third Street
Day 13 (Wednesday, April 17)	E. Fourth Street, Clayton Avenue, E. Fifth Street and E. Ninth Street
Day 14 (Thursday, April 18)	Hollengreen Estates and S. Church Street
Day 15 (Friday, April 19)	W. Main Street and W. Second Street
Day 16 (Monday, April 22)	W. Second Street, W. Third Street and Fairview Avenue
Day 17 (Tuesday, April 23)	Golden Spring Drive, Cleveland Avenue, W. Fourth Street and W. Fifth Street
Day 18 (Wednesday, April 24)	W. Fifth Street, W. Sixth Street, W. Eighth Street, Park Street, W. Ninth Street and S. Potomac Street
Day 19 (Thursday, April 25)	Eastern parts of Zullinger area
Day 20 (Friday, April 26)	Western parts of Zullinger area

cc: Christopher Devers, Fire Chief
S. Leiter Pryor, Director of Utilities
Jason Stains, Borough Manager
Gordon Cruickshanks, Operations Manager (Water/Sewer)
Borough Authority Members

North Kingstown Water Department

Press Release

NORTH KINGSTOWN WATER
WATER MAIN FLUSHING IN Stony Lane/Old Baptist Road, Davisville Rd, Post Road to begin May 9, 2022

The North Kingstown Water Department will begin flushing hydrants in these areas. Because of the nature of the work, it is not possible to predetermine how long flushing of any given area of will take. Water Department crews will be flushing from 7:30 AM to 3:30 PM daily.

This work is being done as part of the Water Department's semi-annual water main and fire hydrant preventive maintenance program. Flushing removes sediment that normally accumulates in water pipes that could produce bacteria and discoloration if not removed. Flushing is an important component of North Kingstown's system maintenance plan.

Customers should be aware of the potential for dirty and discolored water while mains are being flushed. This is a temporary situation. The water may also be cloudy due to air entrapped in the water. **All water system users are cautioned to check the water for clarity before use**. Should you experience dirty water, simply wait for a period of time and it will clear up. We apologize for any inconvenience this may cause our customers and appreciate your understanding. Anyone having any questions can call the NKWD at 268-1521.

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APPENDIX E

Most Common Questions and Answers about Flushing

(2 PAGE)

Frequently Asked Questions about Water Main Flushing

1. **What is flushing?**

   Flushing is the process of removing water from the distribution system by opening fire hydrants or blow-off valves.

2. **What is Unidirectional flushing?**

   Unidirectional flushing involves controlling the flow of water through the system by opening and closing valves to ensure water moves in a specific direction from the source to the extremities.

3. **When will flushing be done in my neighborhood?**

   You can find the flushing schedule, which lists the dates when each neighborhood will be affected.

4. **Why are we flushing?**

   Flushing is essential for maintaining good water quality and keeping the pipes clean.

5. **Is flushing a waste of water?**

   No, flushing does not waste significant amounts of water. The volume used for flushing is relatively small and crucial for maintaining high water quality.

6. **How will flushing affect me?**

   Most residents won't even notice the flushing activity. However, a few may experience a slight drop in water pressure or encounter some discolored water for a brief period.

7. **How many times do you flush in a year?**

   Flushing typically occurs once or twice a year, usually during the spring or fall seasons. Some areas may require more frequent flushing.

8. **I have medical problems. What kind of issues should I expect?**

   Aside from the possibility of encountering some discolored water, there should be no health concerns related to flushing.

9. **What should I do if my water is discolored?**

   Don't be alarmed if you notice a reddish, yellow, or brown tint in your water during or after flushing in your area. It's advisable to avoid doing laundry for approximately two hours after flushing is complete. Once this time has passed, run the faucets for a few minutes to ensure the water runs clear before resuming normal water use.

10. **What should I do if my discolored water problem does not go away?**

    If the water discoloration persists after a few hours, please contact your local water utility immediately.

11. **Am I going to lose water during flushing?**

    Water service interruptions are not expected during flushing, as the program is designed to maintain water flow throughout the system. However, if you do experience a water outage during flushing, please notify your local water utility promptly.

12. **Are there any safety precautions I should take during flushing?**

    There is no specific safety precautions needed during flushing. However, it is always a good idea to avoid drinking or using discolored water for cooking or food preparation until it clears.

13. **How long does it typically take for the water to clear after flushing?**

    In most cases, the water should clear within a few hours after the flushing is completed. However, in some instances, it may take longer.