Documentation to Amend Drinking Water Health Advisory in Zone I1

JBPHH, O‘ahu, Hawai‘i

Removal Action Report

February 2022

TABLE OF CONTENTS

Note: Dept. of Defense critical infrastructure security information (DCRIT) is not included and all direct hyperlinks may not work.

DOH Checklist to Amend the Drinking Water Health Advisory
Drinking Water Health Advisory initiated November 29, 2021 for
Joint Base Pearl Harbor-Hickam Public Water System No. 360; HEER Incident Case No.: 20211128-1848

Purpose: This checklist identifies the criteria that the Hawaii Department of Health (DOH) will be using to **amend** the Drinking Water Health Advisory (Advisory) in each Zone.

DOH's priority is to protect the public health of the people of Hawaii. DOH will evaluate the "lines of evidence" (Table 1) that must be met before amending the health advisory and issuing notices that the water can be used for all purposes including drinking. The Navy must also commit to following the long-term monitoring (LTM) of system water quality for this incident under the IDWST Drinking Water Sampling Plan, as amended.

Background: A chemical release of petroleum, which is a hazardous substance, entered the Joint Base Pearl Harbor-Hickam (JBPHH) drinking water distribution system and the Red Hill Shaft. This release triggered an emergency response and DOH issuance of an Advisory on November 29, 2021 for the entire JBPHH Public Water System No. 360. State and Federal Drinking Water (DW) Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act do not adequately address petroleum contamination of drinking water. DOH has established Environmental Action Levels (EALs) and Incident Specific Parameters (ISPs) to more comprehensively monitor and respond to petroleum contaminated drinking water. Any contaminants that exceed the State and Federal DW MCLs, EALs, or ISPs require additional action prior to amending the Advisory. Satisfaction of the lines of evidence will be achieved by evaluating the data generated during the investigation conducted by the Interagency Drinking Water System Team (IDWST). The data will be assessed for each Zone of the Drinking Water Distribution System Recovery Plan. All lines of evidence will require documentation.

DOH Project Screening Levels: State and Federal Drinking Water MCLs, specified State Environmental Action Levels, and ISPs are considered in development of Project Screening Levels. The actions for the thresholds for each contaminant are listed in Tables 2 and 3 which are used to evaluate Objectives 1b (Step 0 of the Sampling Plan), 2a (Step 2 of the Sampling Plan) and 2b (Step 4 of the Sampling Plan).

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination is entering the water system.

Objective 1a - **All reported sources of contamination are isolated and contained.**

Incident Specific Criteria - Contamination from **Red Hill Shaft** is isolated from Navy's water distribution system.

Lines of Evidence	Completion Status	Outstanding Items	Notes
Navy confirmation that Red Hill Shaft is isolated from the Navy's water distribution system.	Complete	• Letter with isolation date • Operator logs • SCADA data (as available)	

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination is entering the water system.

Objective 1b - **The regulated public water system's water quality data is compliant.**

Incident Specific Criteria - Data meets Federal DW MCLs, specified State EALs, and ISPs for **Waiawa Shaft**.

Lines of Evidence *	Completion Status	Outstanding Items	Notes
Date Sample Taken at Step 0 of the Sampling Plan Addendum 1	Complete	• Sample Date • Level 4 Validation	• Must meet all of the criteria of *DOH's Guidance on the Approach to Amending the Drinking Water Health Advisory* (Guidance) Table 2 and Guidance Table 3. • Level 4 Validated Laboratory Report for EPA Methods 8260 (VOCs), 8270 (SVOCs), 8015 (TPH-G, TPH-D, TPH-O) plus Tentatively Identified Compounds (TICs)
Date Sample Taken at Entry Point to Distribution	Complete	• Sample Date • Level 4 Validation	• Must meet all of the criteria of Guidance Table 2 and Guidance Table 3. • Contaminants as listed in Sampling Plan Addendum 1, Table 3a. • Level 4 Validated Laboratory Report for Sampling Plan Addendum 1, Table 3a: Distribution Sampling (Step 2b) Summary Drinking Water Analytical Methods, Analytes, Action Levels, and Method Detection Limits

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination is entering the water system.

Objective 1c - No additional contamination through the distribution system is occurring.

Incident Specific Criteria - Cross Connection Control investigation shows distribution system is protected, resulting in no additional sources of contamination.

Lines of Evidence	Completion Status	Outstanding Items	Notes
No contamination of the distribution system is occurring from cross-connections with other petroleum sources during this incident	Complete	Certification form with review of database.	Identify all facilities with petroleum activities (e.g., gas stations, motor pools, waste oil collection systems, ...). Navy shall submit a certification of an inventory database and/or map of non-classified facilities or records of documentation to ensure that backflow risks in those buildings/activities have been evaluated and addressed.
Cross Connection Control/Backflow Program-related documents	Complete	Copy of referenced document.	COMNAVREGHIINST 11330.2C, BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL PROGRAM.

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination remains in the system and water chemistry concerns are addressed.

Objective 2a - **Water within the distribution system meets State and Federal DW MCLs, specified State EALs, and ISPs.**

Incident Specific Criteria –

- Zone flushing plan demonstrates entire distribution system is flushed.
- Sample results show the water in distribution system meets State and Federal DW MCLs, specified State EALs, and ISPs. (Guidance Table 2 and Table 3)
- Drinking water does not show sheen, olfactory evidence, or other qualitative methods of petroleum.

Lines of Evidence	Completion Status	Outstanding Items	Notes
JBPHH water system's approach to flushing and their metrics for success.	Complete	Memorandum of record	Navy and Army to provide hydraulic model exhibits or a flushing line map and plan to show that the flushing approach will achieve directional flushing. Narrative of assumptions in the development of their flushing model inclusive of any simulations that they ran.
Validity of the volumetric exchange model	Complete	Documentation from Dr. Whelton.	Navy to provide documentation from Dr. Andrew J. Whelton or some other precedent (a case study or industry accepted guidance) showing that the volumetric exchange model is a viable flushing method. Navy to reach out to Dr. Whelton or his engineers to provide this information and inform him that DOH is also reaching out to EPA for advice on this.

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination remains in the system and water chemistry concerns are addressed.

Objective 2a - Water within the distribution system meets State and Federal DW MCLs, specified State EALs, and ISPs.

Incident Specific Criteria –

- Zone flushing plan demonstrates entire distribution system is flushed.
- Sample results show the water in distribution system meets State and Federal DW MCLs, specified State EALs, and ISPs. (Guidance Table 2 and Table 3)
- Drinking water does not show sheen, olfactory evidence, or other qualitative methods of petroleum.

Lines of Evidence	Completion Status	Outstanding Items	Notes
Verification that the entire distribution system is flushed volumetrically.	Complete	Hydraulic model records of completed volumetric exchange targets by zone.	The hydraulic model output should show that this volumetric exchange goal was met. This includes providing documentation that shows: • Flushing of dead-end lines and flushing zone gaps meet the volumetric exchange goal based on which hydrants are selected. The model should also show that process does not allow water for flushing to be pulled from a contaminated zone.
Residential Sampling Report for Flushing Zone (Risk Management Summary)	Complete	Level 2 Data Validation.	Contingent upon receipt of the DOH data at Level 2 Data Validation.

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination remains in the system and water chemistry concerns are addressed.

Objective 2b - Water in premise plumbing of homes/buildings meets State and Federal DW MCLs, specified State EALs, and ISPs.

Incident Specific Criteria –

- Flushing Plan includes procedures to ensure no service connections will re-contaminate the distribution system.
- Sample Plan includes 72-hour stagnation to account for leaching of contaminants from premise plumbing.
- Sample results show water in homes/buildings meets State and Federal DW MCLs, specified State EALs, and ISPs.

Lines of Evidence	Completion Status	Outstanding Items	Notes
Flushing Plan includes procedures to ensure no service connections will re-contaminate the distribution system.	Complete	Certification of adequate pressure within distribution system for Zone	Maintain 30 psi within the distribution system during the building flushing operations.
Residential Sampling Report for Flushing Zone (Risk Management Summary)	Complete	Level 4 Data Validation of the 10% of the Zone.	Contingent upon receipt of the 10% of 10% DOH data at Level 4 Data Validation.

February 8, 2022

From: Naval Facilities Engineering Systems Command Representative, IDWS Team
To: Interagency Drinking Water System Team

SUBJ: ZONE I1 REMOVAL ACTION REPORT

Ref: (a) Drinking Water Sampling Plan, December 2021
(b) Drinking Water Distribution System Recovery Plan, December 2021
(c) Single Family Home Flushing Plan Checklist and Standard Operating Procedures, December 23, 2021
(d) Non-Residential Facility Flushing Plan Checklist and Standard Operating Procedures, January 4, 2022
(e) DOH's Guidance on the Approach to Amending the Drinking Water Health Advisory, December 30, 2021; HEER Incident Case No.: 20211128-1848
(f) DOH Checklist to Amend the Drinking Water Health Advisory in Zone XX

Encl: (1) Zone I1 Removal Action Report

1. The enclosed report documents completion of the requirements outlined in references (a) through (f). This is in response to HEER Incident Case No.: 20211128-1848 involving the Joint Base Pearl Harbor Hickam (JBPHH) Public Water System No. 360.

2. On the 20th of November, a spill of jet fuel, specifically JP-5 jet fuel, occurred at the Red Hill Bulk Fuel Storage Facility in an access tunnel that provides fire suppression and service lines for the facility. The fuel spill was cleaned up and, on the 23rd of November, Admiral Paparo, directed an independent investigation of the spill event, and ordered the investigating officer to also determine any connection between the 20 November event and the spill that occurred earlier this year, on the 6th of May. The results of the investigation are pending public release.

On the 27th of November, the Commander, Navy Region Hawaii, RDML Tim Kott, met with the Fleet Logistics Center Commander, who operates The Red Hill Fuel Storage Facility for the Navy, and they jointly made the decision to stop Red Hill Tank fuel transfer operations based on the ongoing investigation into the recent spills.

On Sunday, the 28th of November, the JBPHH HQs and Hawaii Department of Health (HDOH) began receiving phone calls from military residents reporting a chemical or petroleum taste and smell to the water on the Navy's drinking water system. As more calls were received, it became clear that the reports were a clustered around neighborhoods fed by the Red Hill Shaft Well, so the Navy, on the evening of the 28th of November, shut down that well and stood up the Region's Emergency Operations Center to handle the issue. As more calls continued to come in of contaminated water over the next 24 hours, Admiral Paparo, as the senior Navy commander in Hawaii, ordered the establishment of a Joint Crisis Action Team on the 29th of November. The Navy immediately began flushing its potable water distribution system.

On December 8, 2021, HDOH issued Directive One which provided requirements for flushing of the Navy Water System. The Navy began working with HDOH and the U.S. Environmental Protection Agency (EPA) to meet the requirements of this directive and resume flushing of the potable water system.

On December 17, 2021, HDOH, the U.S. Navy, the U.S. Army and EPA established an Interagency Drinking Water System (IDWS) Team to restore safe drinking water to affected JBPHH housing communities. The working group was established to ensure that the agencies were coordinated in actions to restore safe drinking water to Navy water system users and that they had a clear, coordinated source of information as work continued to restore safe drinking water. On the same day, the U.S. Navy, U.S. Army, HDOH, and the EPA jointly signed the Water Distribution System Recovery Plan agreement. The signing of this plan was the second work product of the IDWS Team, which is focused on efficiently and effectively restoring safe drinking water to JBPHH military housing communities. Earlier in that week, the team jointly signed the Drinking Water Sampling Plan.

The flushing of the water distribution lines resumed on December 20, 2021. Residence and non-residence facilities were flushed and sampled after the completion of flushing and testing of the distribution system of a specific Zone. This report specifically documents the requirements outlined in references (a) through (f) for Zone I1.

3. The removal action report (RAR) for Zone I1 documents two specific lines of evidence necessary to amend the drinking water health advisory for Zone I1 as provided by HDOH. The two lines of evidence under evaluation included:

i. Ensure no contamination is entering the water system.
ii. Ensure no contamination remains in the system and water chemistry concerns are addressed.

Each line of evidence has several objectives with specific lines of evidence and incident specific criteria required to be met. Achievement of the criteria will be described and supported with documentation in the subsequent sections of the RAR.

4. I certify under penalty of law that I have personally examined and I am familiar with the information submitted and I the submitted information is true, accurate, and complete.

MENO.MICHAEL.WAYNE.JR.1088310035
Digitally signed by MENO.MICHAEL.WAYNE.JR.1088310035
Date: 2022.02.08 17:50:53 -10'00'

M. W. Meno
Captain, U.S. Navy Civil Engineer Corps

1a

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination is entering the water system.

Objective 1a - All reported sources of contamination are isolated and contained.

Incident Specific Criteria - Contamination from **Red Hill Shaft** is isolated from Navy's water distribution system.

Lines of Evidence	Completion Status	Outstanding Items	Notes
Navy confirmation that Red Hill Shaft is isolated from the Navy's water distribution system.	Complete	• Letter with isolation date • Operator logs • SCADA data (as available)	

1a.0

February 10, 2022

From: Naval Facilities Engineering Systems Command Representative, IDWS Team
To: Interagency Drinking Water System Team

SUBJ: SUMMARY OF LINE OF EVIDENCE OBJECTIVE 1A – ALL REPORTED SOURCES OF CONTAMINATION ARE ISOLATED AND CONTAINED

Encl: (1) Line of Evidence 1a.1, Letter with Isolation Date
(2) Line of Evidence 1a2, Operator Logs and SCADA Data
(3) Photograph of concrete blocking between air gapped isolation flanges

1. Enclosures (1), (2), and (3) document completion of line of evidence objective 1a, all reported sources of contamination are isolated and contained. On the evening of November 28, 2021, the Red Hill Shaft was secured from operation and all pumping operations ceased. The Aiea/Halawa shaft briefly served as the secondary source starting on November 28, 2021, but it was shut down on December 3, 2021 to prevent potential westward contaminant migration in the aquifer and because there were concerns over high chloride concentrations caused by saltwater intrusion. Since December 3, 2021, the Waiawa Shaft has been the sole water source providing potable water to the distribution network. It is located 5.5 miles west of the Red Hill Fuel Facility, and testing has not detected any water quality issues at this source. The Red Hill Shaft discharge pipes were physically re-arranged and encased in concrete on December 24th, 2021 as shown in enclosure (1) and (3), thereby isolating the system as required by line of evidence 1a. The SCADA data in enclosure (2), provided as level of evidence 1a.2 shows the previous statement to be true. All reported sources of contamination are isolated and contained.

2. The Red Hill Shaft pumps are now being used to control the spread of contamination by creating a capture zone in the aquifer by pumping to a 5 MGD GAC system which discharges into the Halawa Stream. The new piping from the pumps to the GAC treatment came from the 20" header where the 20x24 reducer was removed on 24 DEC 2021. A thrust block was poured at this location, around the existing blinded wye fitting as shown in enclosure (3).

3. I certify under penalty of law that I have personally examined and I am familiar with the information submitted and I believe the submitted information I true, accurate, and complete.

MENO.MICHAEL.WAYNE.JR.1088310035
Digitally signed by MENO.MICHAEL.WAYNE.JR.1088310035
Date: 2022.02.10 15:18:58 -10'00'

M. W. Meno
Captain, U.S. Navy Civil Engineer Corps

04 JANUARY 2022

MEMORANDUM FOR RECORD

SUBJECT: Red Hill Potable Water Pumping Station

ENC: (1) Red Hill Pump Station Photographs, Post Pump Isolation dated 12/26/2021
(2) JBPHH Potable Water LOTO Log

1. This Memorandum For Record (MFR) is to document the Red Hill Shaft pump status in relation to the Joint Base Pearl Harbor Hickam Potable Water System

2. In response to fuel contaminants found in the Red Hill Shaft aquifer/development tunnel, the main Red Hill Pumping Station pumps were secured from the Potable Water system. On 3 December 2021, all four Red Hill pumps were electrically Locked Out, Tagged Out (LOTO), see Enclosure (2). (Note: Pump #1 was LOTO on 10 June 2020 due to an unrelated pump issue, and is still out of service, LOTO.) After initially being shut down operationally, and LOTO electrically, the Red Hill pumps were physically isolated from the Potable Water system on 24 December 2021.

3. Physical isolation was performed with in-house NAVFAC forces, with a completion date of 24 December 2022. This work was performed by isolating the system from the pumps at the "wye" fitting adjacent to Red Hill Pump #1. The wye fitting is shown on Enclosure (1). A blind flange was placed on the main header and the wye branch.

4. The 24" blind flange on the main header physically air-gapped and isolated Red Hill pumps #2, #3, and #4. The 16" bling flange in the wye branch physically air-gapped and isolated Red Hill pump #1. This work is shown on Enclosure 1.

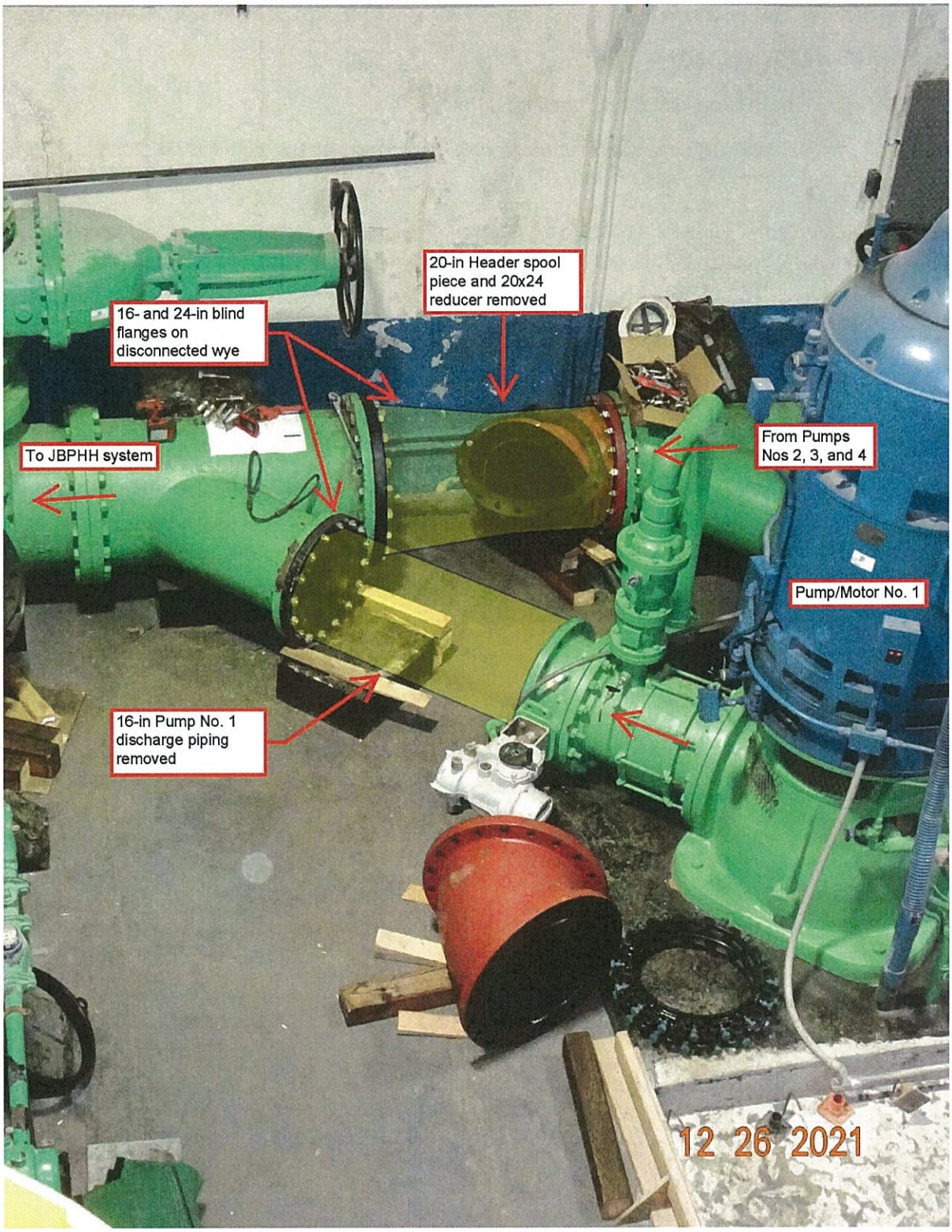
5. The work the NAVFAC in-house forces performed removed any source or pathway from the Red Hill aquifer to the JBPHH Potable Water system.

MITCHELL.JEREMY.W.1395400700
Digitally signed by MITCHELL.JEREMY.W.1395400700
Date: 2022.01.04 07:56:02 -10'00'

J. MITCHELL
Deputy Public Works Officer
Joint Base Pearl Harbor Hickam

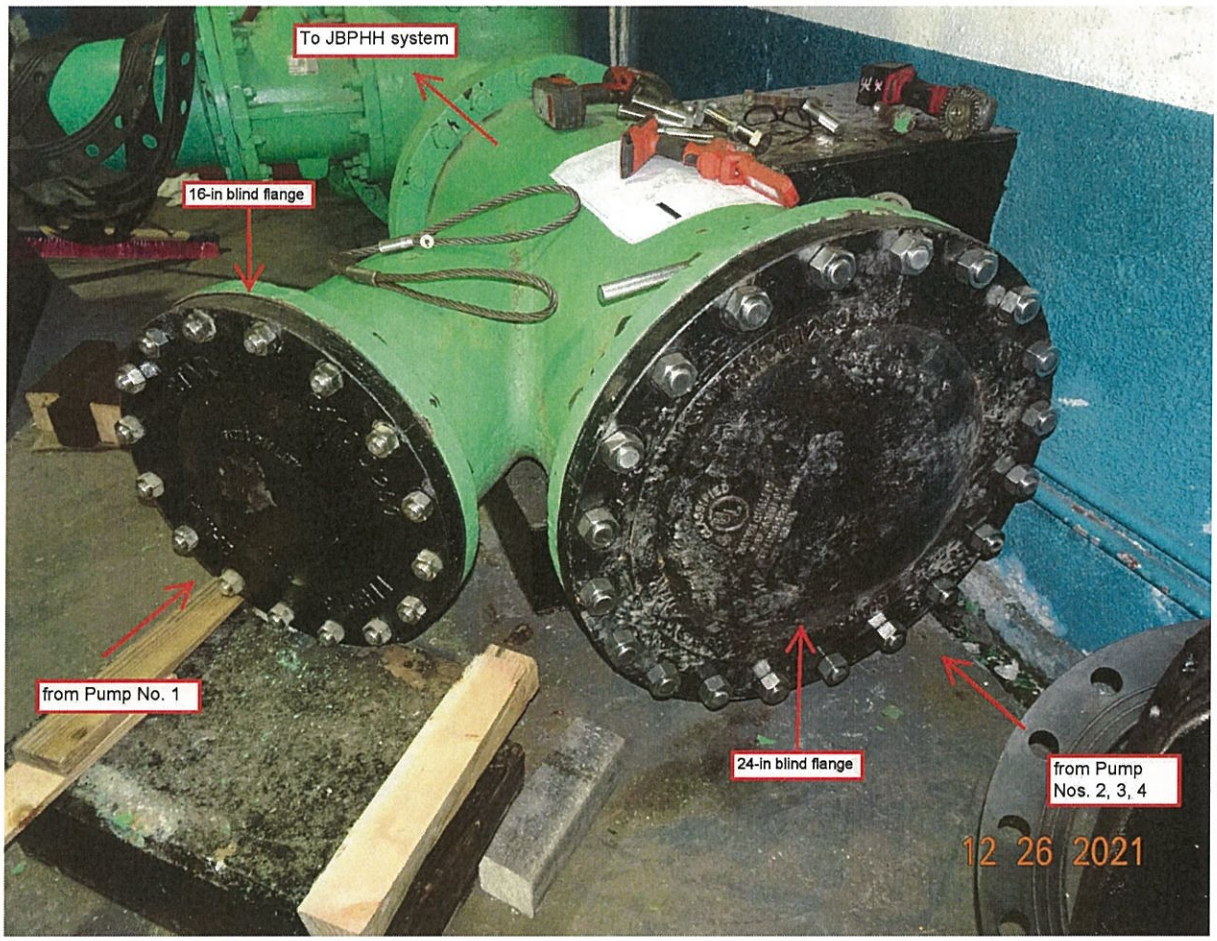
Red Hill Pump Station Photographs
Post Pump Isolation dated 12/26/2021

Enclosure (1)



Red Hill Pump Station Photographs
Post Pump Isolation dated 12/26/2021

Enclosure (1)



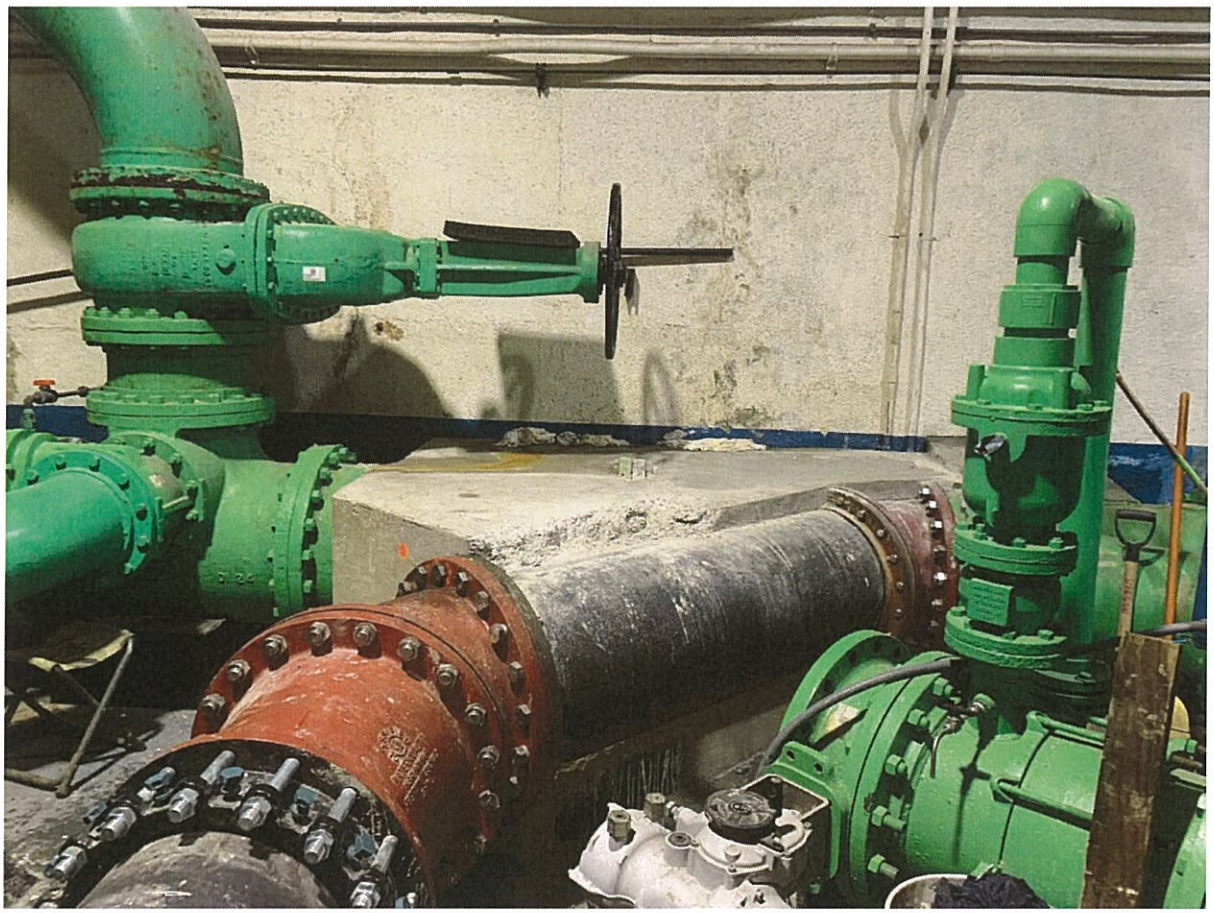
NAVFAC Hawaii - Potable Water Utilities
Lock Out Tag Out (LOTO) Form

Locked Out		Back in Service		Location	Circuit / Equipment being LOTO	Reason for LOTO	Lock No.	Tag No.	Authorized Employee
Date	Time	Date	Time						
12 MAR 20	0930			REDHILL	MP#1	PUMP OVERHAUL		010	
5 JUN 20		20 MAY 21	1200	WAIAKA	CB #20	FAULT IN BREAKER		1	
10 JUN 20	0900			REDHILL	PUMP CONTROL MP#1	PUMP OVERHAUL		011	
10 JUN 20	0900			REDHILL	MCC MP#1	PUMP OVERHAUL		012	
16 JUN 20	0945			WAIAWA	CB #4B	FAULT-PUMP CONTROLS		2	
10 MAY 21				HALAWA	MCC#1	MOTOR FAULT		3	
2 JUN 21	0800			WAIAWA	CB# 8B	FAULT PUMP CONTROLS		5	
2 JUN 21	0800	30 JUN 21	2330	WAIAWA	CB# 10B	HECO OUTAGE		4	
2 JUN 21	0900			HALAWA	MCC #2	PUMP REMOVED		6	
30 JUN 21	2330	7 JUL 21	1300	WAIAWA	CB#1B	FAIL TO CLOSE		8	
19 JUL 21	0745	19 JUL	0900	HALAWA	EXHAUST FAN	REPLACE BELTS			
17 NOV 21	1230			MANANA	PUMP #1	PUMP FAIL			
17 NOV 21	1230			MANANA	PUMP #2	MOTOR FAIL			
3 DEC 21	0925			REDHILL	MCC MP#2	COMMAND INTERLOCK IN WELL			

NAVFAC NAVFAC

Locked Out		Back in Service		Location	Circuit / Equipment being LOTO	Reason for LOTO	Lock No.	Tag No.	Authorized Employee
Date	Time	Date	Time						
3DEC21	0920			REDHILL	MCC MP#3	COMMAND INTEREST WORK IN WELL			AN
3DEC21	0927			REDHILL	MCC MP#4	COMMAND INTEREST WORK IN WELL			AN
3DEC21				HALAWA	MCC #3	COMMAND INTEREST ISOLATE SYSTEM			AN

Red Hill Pump Station Photographs
Repurposed Pumps for 5 MGD GAC Treatment



February 10, 2022

SUMMARY OF OPERATOR LOGS AND SCADA DATA

1. OBJECTIVE: Provide a description of water sources that supplied the Joint Base Pearl Harbor Hickam (JBPHH) potable water system (system) prior-to and after the fuel contamination incident that occurred in late November 2021.

2. BACKGROUND:

2.1. Portions of the Navy water distribution system serving JBPHH and surrounding areas were exposed to low levels of fuel contamination with initial indications in the form of smell reports occurring on or about 28 November 2021.

2.2. Prior to the aquifer contamination incident, water users connected to the Navy's system were supplied by three Navy owned water sources, Red Hill Shaft, Aiea/Halawa Shaft and Waiawa Shaft. In the time period prior to the incident, Waiawa Shaft was the main water source supplying water to the JBPHH system with at least one pump operating full time (100%). A single Red Hill Shaft pump was operated intermittently as a secondary source to the system. The Aiea/Halawa shaft was not being operated due to concerns over high chloride concentrations caused by saltwater intrusion into the aquifer.

2.3. On the evening of 28 November 2021, the Red Hill Shaft was secured and all pumping operations ceased. The Aiea/Halawa shaft briefly served as the secondary source starting on 28 November 2021 but was shut down on 03 December 2021 to prevent westward contaminant migration in the aquifer.

2.4. Since 03 December 2021, Waiawa Shaft has been the sole water source providing potable water to the distribution network. It is located 5.5 miles west of the Red Hill Fuel Facility and testing has not found any water quality issues at this source.

3. DATA INTERPERETATION: The Supervisory Control and Data Acquisition (SCADA) data provided in reference (a) includes tabular and graphical depictions of flow from the three source pump stations, aquifer water surface elevations above mean sea level (MSL) and the water level in the 6 million gallon (MG) S1 and S2 water storage tanks. The data was provided as a daily average (i.e. data was averaged over the 24 hours of each day from 00:00 to 23:59) and ranges from 01 November 2021 to 08 January 2022.

3.1 WAIAWA SHAFT/PUMP STATION: Prior to 28 November, The Waiawa Pump Station (PS) was supplying an average of 16.6 million gallons per day (MGD) of potable water to the system. After 28 November, demand reductions from turning off irrigation and smaller residential demand reduced the water supplied by the Waiawa PS to an average of 15.5 MGD. This was 76% of the 22 MGD total system demand prior to 28 November 2021.

There was an inverse correlation between the aquifer water surface elevation and water pumped out of the aquifer. When Waiawa PS was pumping between 16 and 18 MGD, the aquifer water surface elevation dropped to between 8.0 and 10.0 feet MSL. When pumping was reduced between 15 and 16 MGD, the aquifer water surface was raised to between 15.0 and 17.0 feet

above MSL. See Figure 1 below for a graphical depiction of the daily average aquifer water surface elevation and pumps flows from Waiawa Shaft.

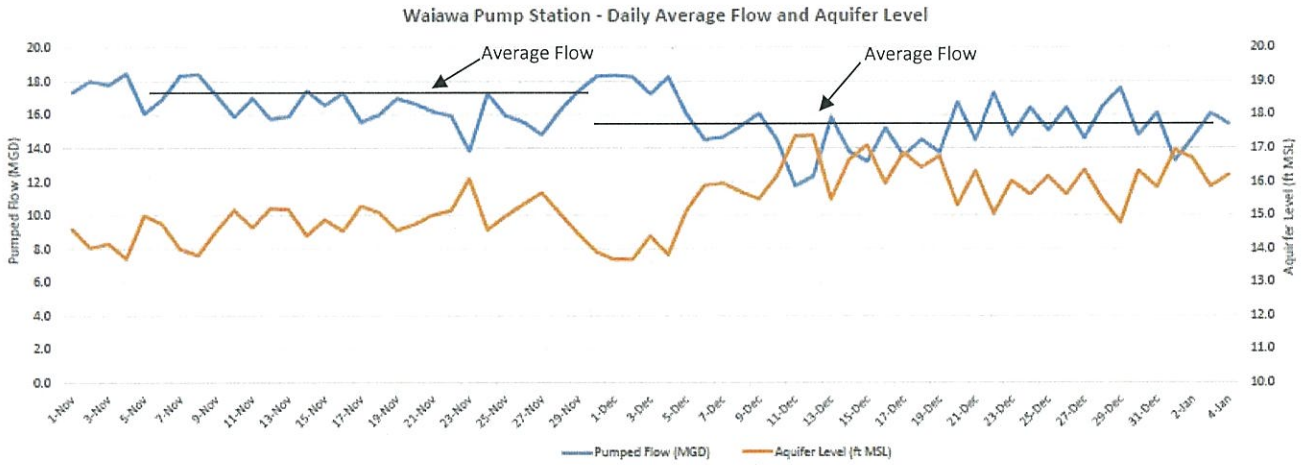


Figure 1. Waiawa Shaft Daily Average Flows and Aquifer Water Surface Elevation

3.2 RED HILL SHAFT/PUMP STATION: Prior to being shut down on 28 November 2021, the Red Hill PS was supplying an average of 5.3 MGD to the system. The represented 24% of the 22 MGD total system demand. A shown in Figure 2, the Red Hill Pump Station has not been operated since 28 November 2021.

Since pumping ceased, the aquifer water surface elevation has raised from approximately 2 ft MSL to almost 6 ft MSL

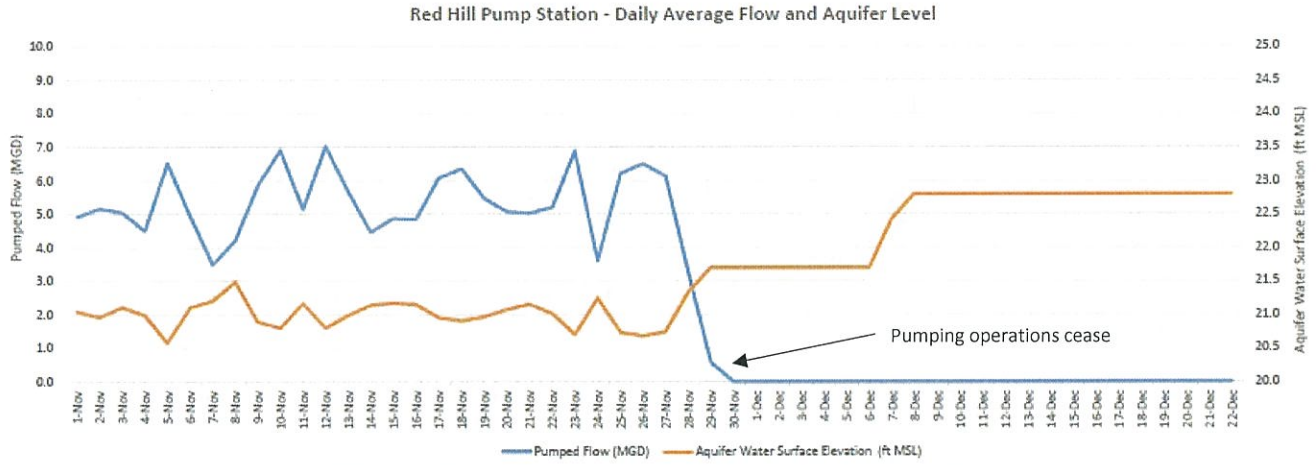


Figure 2. Red Hill Shaft Daily Average Flows and Aquifer Water Surface Elevation

3.3 HALAWA/AIEA SHAFT/PUMP STATION: Halawa Shaft was briefly operated from 28 November to 03 December 2021. The reasons for shutdown are as follows:

1. Demand reductions made it so that Waiawa Shaft could supply 100% of the water to the system,

2. there were concerns over westward plume migration from Red Hill if Halawa remained active,
3. water system operators had advised that high chloride concentrations in the Halawa/Aiea Shaft had caused water quality problems in the past.

The aquifer water surface elevation was around 12.0 ft MSL prior to turning the pumps on at the Halawa/Aiea PS. After the pumping ceased, the aquifer recovered to around 12.8 ft MSL.

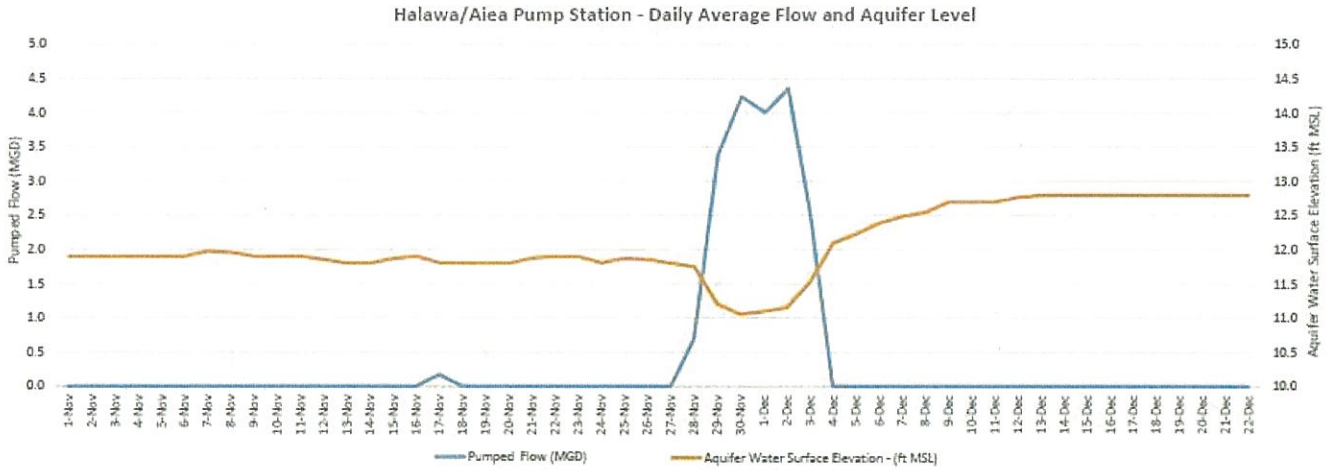


Figure 2. Halawa/Aiea Shaft Daily Average Flows and Aquifer Water Surface Elevation

16

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination is entering the water system.

Objective 1b - The regulated public water system's water quality data is compliant.

Incident Specific Criteria - Data meets Federal DW MCLs, specified State EALs, and ISPs for **Waiawa Shaft**.

Lines of Evidence *	Completion Status	Outstanding Items	Notes
Date Sample Taken at Step 0 of the Sampling Plan Addendum 1	Complete	• Sample Date • Level 4 Validation	• Must meet all of the criteria of *DOH's Guidance on the Approach to Amending the Drinking Water Health Advisory* (Guidance) Table 2 and Guidance Table 3. • Level 4 Validated Laboratory Report for EPA Methods 8260 (VOCs), 8270 (SVOCs), 8015 (TPH-G, TPH-D, TPH-O) plus Tentatively Identified Compounds (TICs)
Date Sample Taken at Entry Point to Distribution	Complete	• Sample Date • Level 4 Validation	• Must meet all of the criteria of Guidance Table 2 and Guidance Table 3. • Contaminants as listed in Sampling Plan Addendum 1, Table 3a. • Level 4 Validated Laboratory Report for Sampling Plan Addendum 1, Table 3a: Distribution Sampling (Step 2b) Summary Drinking Water Analytical Methods, Analytes, Action Levels, and Method Detection Limits

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Location ID:					I1-SHFTWAIA	I1-SHFTWAIA	I1-SHFTWAIA
Field Sample ID:					220111-WS-ZT01	220113-WS-ZT01	220113-WS-ZT03
Sample Date:					2022-01-11	2022-01-13	2022-01-13
Sample Type:					N	N	N
GENCHEM (mg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**		**SDG: 810121191**
Total Organic Carbon	2	None	None	None	0.190 U	--	0.250 U
HC (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 5801092421**	**SDG: 5801092721**	**SDG: 5801092711**
Petroleum Hydrocarbons (as Diesel)	200	400	None	None	90.0 U	91.0 U	92.0 U
Petroleum Hydrocarbons (as Gasoline)	200	300	None	None	31.0 U	31.0 U	31.0 U
Petroleum Hydrocarbons (as Motor Oil)	200	500	None	None	180 U	180 U	180 U
HERB (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**			**SDG: 980559**
Pentachlorophenol	None	None	None	None	--	--	0.0200 U
HG (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**		
Mercury	0.025	0.025	2	2	0.0170 U	--	--
METAL (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**		**SDG: 980559**
Antimony	6	6	6	6	**0.0915 J**	--	0.110 U
Arsenic	10	10	10	10	**0.207 J**	--	0.210 U
Barium	220	220	2000	2000	**1.72**	--	**1.80 J**

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Beryllium	0.66	0.66	4	4	0.0624 U	--	0.0910 U
Cadmium	3	3	5	5	0.0416 U	--	0.0290 U
Chromium	11	11	100	100	**1.46**	--	**1.50**
Copper	2.9	2.9	1300	1300	**21.2**	--	**46.0**
Lead	15	5.6	15	15	**0.265**	--	**0.0630 J**
Selenium	5	5	50	50	**0.704**	--	**0.350 J**
Thallium	2	2	2	2	0.0210 U	--	0.0410 U

SVOC (µg/L)	Incident Specific Parameters	DOH Environmental Action Levels Table D-1A Groundwater	DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents	Environmental Protection Agency Maximum Contaminant Levels	SDG: 2A12046	SDG: 5801092721	SDG: 810121191
1,2,4-Trichlorobenzene	70	70	70	70	--	0.0930 U	--
1,2-Dichlorobenzene	10	10	600	600	--	0.0520 U	--
1,3-Dichlorobenzene	None	None	None	None	--	0.0410 U	--
1,4-Dichlorobenzene	5	5	75	None	--	0.0410 U	--
1-Methylnaphthalene	2.1	10	None	None	0.00801 U	--	0.0190 U
2,4,5-Trichlorophenol	None	None	None	None	--	0.100 U	--
2,4,6-Trichlorophenol	None	None	None	None	--	0.100 U	--
2,4-Dichlorophenol	None	None	None	None	--	0.210 U	--
2,4-Dimethylphenol	None	None	None	None	--	0.170 U	--
2,4-Dinitrophenol	None	None	None	None	--	1.70 U	--
2,4-Dinitrotoluene	None	None	None	None	--	0.100 U	--
2,6-Dinitrotoluene	None	None	None	None	--	0.100 U	--
2-Chloronaphthalene	None	None	None	None	--	0.0720 U	--
2-Chlorophenol	None	None	None	None	--	0.0520 U	--
2-Ethylhexyl adipate	None	None	None	None	0.00962 U	--	--
2-Methylnaphthalene	4.7	10	None	None	0.00904 U	--	0.0190 U
2-Methylphenol (o-Cresol)	None	None	None	None	--	0.0520 U	--
2-Nitroaniline	None	None	None	None	--	0.100 U	--
3,3'-Dichlorobenzidine	None	None	None	None	--	0.270 U	--
3-Nitroaniline	None	None	None	None	--	0.170 U	--
4,6-Dinitro-2-methylphenol	None	None	None	None	--	0.570 U	--
4-Bromophenyl phenyl ether	None	None	None	None	--	0.0620 U	--

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
4-Chloro-3-methylphenol	None	None	None	None	--	0.130 U	--
4-Chloroaniline	None	None	None	None	--	0.610 U	--
4-Chlorophenyl phenyl ether	None	None	None	None	--	0.0520 U	--
4-Nitroaniline	None	None	None	None	--	0.220 U	--
4-Nitrophenol	None	None	None	None	--	1.80 U	--
Acenaphthene	None	None	None	None	--	0.0520 U	--
Acenaphthylene	None	None	None	None	--	0.0620 U	--
Alachlor	None	None	None	None	0.0110 U	--	0.0480 U
Anthracene	None	None	None	None	--	0.0520 U	--
Atrazine	None	None	None	None	0.00734 U	--	0.0290 U
Benzo(a)anthracene	None	None	None	None	--	0.0520 U	--
Benzo(a)pyrene	0.06	0.06	0.2	0.2	0.0117 UJ	0.0410 U	0.00960 U
Benzo(b)fluoranthene	None	None	None	None	--	0.0410 U	--
Benzo(g,h,i)perylene	None	None	None	None	--	0.0410 U	--
Benzo(k)fluoranthene	None	None	None	None	--	0.0520 U	--
Benzyl butyl phthalate	None	None	None	None	--	0.280 U	--
Bis(2-chloroethoxy)methane	None	None	None	None	--	0.0520 U	--
Bis(2-chloroethyl) ether (2-Chloroethyl ether)	None	None	None	None	--	0.0310 U	--
Bis(2-ethylhexyl)phthalate	3	3	6	6	0.437 U	0.770 U	0.580 U
Carbazole	None	None	None	None	--	0.100 U	--
Chlordane	None	None	None	None	0.0669 U	--	0.0320 U
Chrysene	None	None	None	None	--	0.0410 U	--
Cresols, m- & p-	None	None	None	None	--	0.100 U	--
Dibenz(a,h)anthracene	None	None	None	None	--	0.0720 U	--
Dibenzofuran	None	None	None	None	--	0.100 U	--
Diethyl phthalate	None	None	None	None	--	0.160 U	--
Dimethyl phthalate	None	None	None	None	--	0.0620 U	--
Di-n-butyl phthalate	None	None	None	None	--	0.200 U	--
di-n-Octyl phthalate	None	None	None	None	--	0.130 U	--
Dioctyl adipate	None	None	None	None	--	--	0.580 U
Endrin	None	None	None	None	0.00991 U	--	0.00500 U
Fluoranthene	None	None	None	None	--	0.0620 U	--

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Fluorene	None	None	None	None	--	0.0520 U	--
gamma-BHC (Lindane)	None	None	None	None	0.00633 U	--	0.00700 U
Heptachlor	None	None	None	None	0.00965 U	--	0.00300 U
Heptachlor epoxide	None	None	None	None	0.0122 U	--	0.00500 U
Hexachlorobenzene	0.0003	0.0003	1	1	0.0980 U	0.0410 U	0.00960 U
Hexachlorobutadiene	None	None	None	None	--	0.0620 U	--
Hexachlorocyclopentadiene	50	None	50	50	0.00594 U	0.140 U	0.00960 U
Hexachloroethane	None	None	None	None	--	0.0520 U	--
Indeno(1,2,3-c,d)pyrene	None	None	None	None	--	0.130 U	--
Isophorone	None	None	None	None	--	0.100 U	--
Methoxychlor	None	None	None	None	0.00863 U	--	0.0320 U
Naphthalene	12	17	None	None	0.0103 U	0.170 U	0.0190 U
Nitrobenzene	None	None	None	None	--	0.0410 U	--
N-Nitrosodi-n-propylamine	None	None	None	None	--	0.0620 UJ	--
N-Nitrosodiphenylamine	None	None	None	None	--	0.0720 U	--
PCB, Total	None	None	None	None	0.100 U	--	--
PCB-1016 (Aroclor 1016)	None	None	None	None	0.0157 U	--	0.0220 U
PCB-1221 (Aroclor 1221)	None	None	None	None	0.0436 U	--	0.0790 U
PCB-1232 (Aroclor 1232)	None	None	None	None	0.0102 U	--	0.0850 U
PCB-1242 (Aroclor 1242)	None	None	None	None	0.0737 U	--	0.0720 U
PCB-1248 (Aroclor 1248)	None	None	None	None	0.0941 U	--	0.0230 U
PCB-1254 (Aroclor 1254)	None	None	None	None	0.0869 U	--	0.0350 U
PCB-1260 (Aroclor 1260)	None	None	None	None	0.0379 U	--	0.0330 U
Pentachlorophenol	None	None	None	None	0.0242 U	0.530 U	--
Phenanthrene	None	None	None	None	--	0.120 U	--
Phenol	None	None	None	None	--	0.370 U	--
Pyrene	None	None	None	None	--	0.0410 U	--
Simazine	None	None	None	None	0.00734 U	--	0.0290 U
VOC (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**	**SDG: 5801092721**	**SDG: C22A017REV1**
1,1,1-Trichloroethane	11	11	200	200	0.256 U	0.390 U	0.119 U

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
1,1,2,2-Tetrachloroethane	None	None	None	None	--	0.520 U	--
1,1,2-Trichloroethane	5	5	3	5	0.190 U	0.240 U	0.288 U
1,1-Dichloroethane	None	None	None	None	--	0.220 U	--
1,1-Dichloroethene	7	7	7	7	0.160 U	0.280 U	0.128 U
1,2,4-Trichlorobenzene	70	70	70	70	0.170 U	--	0.318 U
1,2-Dichlorobenzene	10	10	600	600	0.190 U	--	0.272 U
1,2-Dichloroethane	5	5	5	5	0.243 U	0.420 U	0.0884 U
1,2-Dichloroethene	None	None	None	None	--	0.390 U	--
1,2-Dichloropropane	5	5	5	5	0.130 U	0.180 U	0.129 U
1,4-Dichlorobenzene	5	5	75	None	0.180 U	--	0.245 U
2-Butanone (MEK)	None	None	None	None	--	4.70 U	--
2-Hexanone	None	None	None	None	--	4.00 U	--
4-Methyl-2-pentanone (MIBK)	None	None	None	None	--	2.50 U	--
Acetone	None	None	None	None	--	3.20 U	--
Benzene	5	5	5	5	0.150 U	0.240 U	0.0846 U
Bromodichloromethane	None	None	None	None	--	0.290 U	--
Bromoform	None	None	None	None	--	0.510 U	--
Bromomethane	None	None	None	None	--	0.210 U	--
Carbon disulfide	None	None	None	None	--	0.530 U	--
Carbon Tetrachloride	5	5	5	5	0.270 U	0.300 U	0.165 U
Chlorobenzene	25	25	100	100	0.150 U	0.440 U	0.146 U
Chloroethane	None	None	None	None	--	0.350 U	--
Chloroform	None	None	None	None	--	0.260 U	--
Chloromethane	None	None	None	None	--	0.280 U	--
cis-1,2-Dichloroethene	70	70	70	70	0.250 U	0.350 U	0.0570 U
cis-1,3-Dichloropropene	None	None	None	None	--	0.200 U	--
Dibromochloromethane	None	None	None	None	--	0.430 U	--
Ethylbenzene	700	7.3	700	700	0.210 U	0.500 U	0.141 U
m,p-Xylene	10000	13	None	None	0.330 U	0.530 U	0.317 U
Methylene chloride	5	5	5	5	0.303 U	1.40 U	2.15 U
o-Xylene	10000	13	None	None	0.200 U	0.390 U	0.157 U
Styrene	10	10	100	100	0.190 U	0.530 U	0.224 U

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Tetrachloroethene (PCE)	5	5	5	5	0.180 U	0.410 U	0.125 U
Toluene	1000	9.8	1000	1000	0.294 U	0.390 U	0.120 U
trans-1,2-Dichloroethene	100	100	100	100	0.259 U	0.390 U	0.0958 U
trans-1,3-Dichloropropene	None	None	None	None	--	0.410 U	--
Trichloroethene (TCE)	5	5	5	5	0.180 U	0.260 U	0.0574 U
Vinyl chloride	2	2	2	2	0.180 U	0.220 U	0.611 U
Xylenes, Total	10000	13	10000	10000	--	0.530 U	--

Notes:

-- indicates that the sample was Not Analyzed for the analyte

Results highlighted yellow exceed the ISP
Results in purple font also exceed the EALs
Results in green font also exceed the DOH MCL
Results in blue font also exceed the EPA MCL

µg/L = Micrograms per Liter

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Location ID:					I1-SHFTWAIA	I1-SHFTWAIA	I1-SHFTWAIA
Field Sample ID:					220111-WS-ZT01	220113-WS-ZT01	220113-WS-ZT03
Sample Date:					2022-01-11	2022-01-13	2022-01-13
Sample Type:					N	N	N
GENCHEM (mg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**		**SDG: 810121191**
Total Organic Carbon	2	None	None	None	0.190 U	--	0.250 U
HC (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 5801092421**	**SDG: 5801092721**	**SDG: 5801092711**
Petroleum Hydrocarbons (as Diesel)	200	400	None	None	90.0 U	91.0 U	92.0 U
Petroleum Hydrocarbons (as Gasoline)	200	300	None	None	31.0 U	31.0 U	31.0 U
Petroleum Hydrocarbons (as Motor Oil)	200	500	None	None	180 U	180 U	180 U
HERB (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**			**SDG: 980559**
Pentachlorophenol	None	None	None	None	--	--	0.0200 U
HG (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**		
Mercury	0.025	0.025	2	2	0.0170 U	--	--
METAL (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**		**SDG: 980559**
Antimony	6	6	6	6	**0.0915 J**	--	0.110 U
Arsenic	10	10	10	10	**0.207 J**	--	0.210 U
Barium	220	220	2000	2000	**1.72**	--	**1.80 J**

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Beryllium	0.66	0.66	4	4	0.0624 U	--	0.0910 U
Cadmium	3	3	5	5	0.0416 U	--	0.0290 U
Chromium	11	11	100	100	**1.46**	--	**1.50**
Copper	2.9	2.9	1300	1300	**21.2**	--	**46.0**
Lead	15	5.6	15	15	**0.265**	--	**0.0630 J**
Selenium	5	5	50	50	**0.704**	--	**0.350 J**
Thallium	2	2	2	2	0.0210 U	--	0.0410 U

SVOC (µg/L)	Incident Specific Parameters	DOH Environmental Action Levels Table D-1A Groundwater	DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents	Environmental Protection Agency Maximum Contaminant Levels	SDG: 2A12046	SDG: 5801092721	SDG: 810121191
1,2,4-Trichlorobenzene	70	70	70	70	--	0.0930 U	--
1,2-Dichlorobenzene	10	10	600	600	--	0.0520 U	--
1,3-Dichlorobenzene	None	None	None	None	--	0.0410 U	--
1,4-Dichlorobenzene	5	5	75	None	--	0.0410 U	--
1-Methylnaphthalene	2.1	10	None	None	0.00801 U	--	0.0190 U
2,4,5-Trichlorophenol	None	None	None	None	--	0.100 U	--
2,4,6-Trichlorophenol	None	None	None	None	--	0.100 U	--
2,4-Dichlorophenol	None	None	None	None	--	0.210 U	--
2,4-Dimethylphenol	None	None	None	None	--	0.170 U	--
2,4-Dinitrophenol	None	None	None	None	--	1.70 U	--
2,4-Dinitrotoluene	None	None	None	None	--	0.100 U	--
2,6-Dinitrotoluene	None	None	None	None	--	0.100 U	--
2-Chloronaphthalene	None	None	None	None	--	0.0720 U	--
2-Chlorophenol	None	None	None	None	--	0.0520 U	--
2-Ethylhexyl adipate	None	None	None	None	0.00962 U	--	--
2-Methylnaphthalene	4.7	10	None	None	0.00904 U	--	0.0190 U
2-Methylphenol (o-Cresol)	None	None	None	None	--	0.0520 U	--
2-Nitroaniline	None	None	None	None	--	0.100 U	--
3,3'-Dichlorobenzidine	None	None	None	None	--	0.270 U	--
3-Nitroaniline	None	None	None	None	--	0.170 U	--
4,6-Dinitro-2-methylphenol	None	None	None	None	--	0.570 U	--
4-Bromophenyl phenyl ether	None	None	None	None	--	0.0620 U	--

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
4-Chloro-3-methylphenol	None	None	None	None	--	0.130 U	--
4-Chloroaniline	None	None	None	None	--	0.610 U	--
4-Chlorophenyl phenyl ether	None	None	None	None	--	0.0520 U	--
4-Nitroaniline	None	None	None	None	--	0.220 U	--
4-Nitrophenol	None	None	None	None	--	1.80 U	--
Acenaphthene	None	None	None	None	--	0.0520 U	--
Acenaphthylene	None	None	None	None	--	0.0620 U	--
Alachlor	None	None	None	None	0.0110 U	--	0.0480 U
Anthracene	None	None	None	None	--	0.0520 U	--
Atrazine	None	None	None	None	0.00734 U	--	0.0290 U
Benzo(a)anthracene	None	None	None	None	--	0.0520 U	--
Benzo(a)pyrene	0.06	0.06	0.2	0.2	0.0117 UJ	0.0410 U	0.00960 U
Benzo(b)fluoranthene	None	None	None	None	--	0.0410 U	--
Benzo(g,h,i)perylene	None	None	None	None	--	0.0410 U	--
Benzo(k)fluoranthene	None	None	None	None	--	0.0520 U	--
Benzyl butyl phthalate	None	None	None	None	--	0.280 U	--
Bis(2-chloroethoxy)methane	None	None	None	None	--	0.0520 U	--
Bis(2-chloroethyl) ether (2-Chloroethyl ether)	None	None	None	None	--	0.0310 U	--
Bis(2-ethylhexyl)phthalate	3	3	6	6	0.437 U	0.770 U	0.580 U
Carbazole	None	None	None	None	--	0.100 U	--
Chlordane	None	None	None	None	0.0669 U	--	0.0320 U
Chrysene	None	None	None	None	--	0.0410 U	--
Cresols, m- & p-	None	None	None	None	--	0.100 U	--
Dibenz(a,h)anthracene	None	None	None	None	--	0.0720 U	--
Dibenzofuran	None	None	None	None	--	0.100 U	--
Diethyl phthalate	None	None	None	None	--	0.160 U	--
Dimethyl phthalate	None	None	None	None	--	0.0620 U	--
Di-n-butyl phthalate	None	None	None	None	--	0.200 U	--
di-n-Octyl phthalate	None	None	None	None	--	0.130 U	--
Dioctyl adipate	None	None	None	None	--	--	0.580 U
Endrin	None	None	None	None	0.00991 U	--	0.00500 U
Fluoranthene	None	None	None	None	--	0.0620 U	--

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Fluorene	None	None	None	None	--	0.0520 U	--
gamma-BHC (Lindane)	None	None	None	None	0.00633 U	--	0.00700 U
Heptachlor	None	None	None	None	0.00965 U	--	0.00300 U
Heptachlor epoxide	None	None	None	None	0.0122 U	--	0.00500 U
Hexachlorobenzene	0.0003	0.0003	1	1	0.0980 U	0.0410 U	0.00960 U
Hexachlorobutadiene	None	None	None	None	--	0.0620 U	--
Hexachlorocyclopentadiene	50	None	50	50	0.00594 U	0.140 U	0.00960 U
Hexachloroethane	None	None	None	None	--	0.0520 U	--
Indeno(1,2,3-c,d)pyrene	None	None	None	None	--	0.130 U	--
Isophorone	None	None	None	None	--	0.100 U	--
Methoxychlor	None	None	None	None	0.00863 U	--	0.0320 U
Naphthalene	12	17	None	None	0.0103 U	0.170 U	0.0190 U
Nitrobenzene	None	None	None	None	--	0.0410 U	--
N-Nitrosodi-n-propylamine	None	None	None	None	--	0.0620 UJ	--
N-Nitrosodiphenylamine	None	None	None	None	--	0.0720 U	--
PCB, Total	None	None	None	None	0.100 U	--	--
PCB-1016 (Aroclor 1016)	None	None	None	None	0.0157 U	--	0.0220 U
PCB-1221 (Aroclor 1221)	None	None	None	None	0.0436 U	--	0.0790 U
PCB-1232 (Aroclor 1232)	None	None	None	None	0.0102 U	--	0.0850 U
PCB-1242 (Aroclor 1242)	None	None	None	None	0.0737 U	--	0.0720 U
PCB-1248 (Aroclor 1248)	None	None	None	None	0.0941 U	--	0.0230 U
PCB-1254 (Aroclor 1254)	None	None	None	None	0.0869 U	--	0.0350 U
PCB-1260 (Aroclor 1260)	None	None	None	None	0.0379 U	--	0.0330 U
Pentachlorophenol	None	None	None	None	0.0242 U	0.530 U	--
Phenanthrene	None	None	None	None	--	0.120 U	--
Phenol	None	None	None	None	--	0.370 U	--
Pyrene	None	None	None	None	--	0.0410 U	--
Simazine	None	None	None	None	0.00734 U	--	0.0290 U
VOC (µg/L)	**Incident Specific Parameters**	**DOH Environmental Action Levels Table D-1A Groundwater**	**DOH Safe Drinking Water Branch (SDWB) Regulatory Constituents**	**Environmental Protection Agency Maximum Contaminant Levels**	**SDG: 2A12046**	**SDG: 5801092721**	**SDG: C22A017REV1**
1,1,1-Trichloroethane	11	11	200	200	0.256 U	0.390 U	0.119 U

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
1,1,2,2-Tetrachloroethane	None	None	None	None	--	0.520 U	--
1,1,2-Trichloroethane	5	5	3	5	0.190 U	0.240 U	0.288 U
1,1-Dichloroethane	None	None	None	None	--	0.220 U	--
1,1-Dichloroethene	7	7	7	7	0.160 U	0.280 U	0.128 U
1,2,4-Trichlorobenzene	70	70	70	70	0.170 U	--	0.318 U
1,2-Dichlorobenzene	10	10	600	600	0.190 U	--	0.272 U
1,2-Dichloroethane	5	5	5	5	0.243 U	0.420 U	0.0884 U
1,2-Dichloroethene	None	None	None	None	--	0.390 U	--
1,2-Dichloropropane	5	5	5	5	0.130 U	0.180 U	0.129 U
1,4-Dichlorobenzene	5	5	75	None	0.180 U	--	0.245 U
2-Butanone (MEK)	None	None	None	None	--	4.70 U	--
2-Hexanone	None	None	None	None	--	4.00 U	--
4-Methyl-2-pentanone (MIBK)	None	None	None	None	--	2.50 U	--
Acetone	None	None	None	None	--	3.20 U	--
Benzene	5	5	5	5	0.150 U	0.240 U	0.0846 U
Bromodichloromethane	None	None	None	None	--	0.290 U	--
Bromoform	None	None	None	None	--	0.510 U	--
Bromomethane	None	None	None	None	--	0.210 U	--
Carbon disulfide	None	None	None	None	--	0.530 U	--
Carbon Tetrachloride	5	5	5	5	0.270 U	0.300 U	0.165 U
Chlorobenzene	25	25	100	100	0.150 U	0.440 U	0.146 U
Chloroethane	None	None	None	None	--	0.350 U	--
Chloroform	None	None	None	None	--	0.260 U	--
Chloromethane	None	None	None	None	--	0.280 U	--
cis-1,2-Dichloroethene	70	70	70	70	0.250 U	0.350 U	0.0570 U
cis-1,3-Dichloropropene	None	None	None	None	--	0.200 U	--
Dibromochloromethane	None	None	None	None	--	0.430 U	--
Ethylbenzene	700	7.3	700	700	0.210 U	0.500 U	0.141 U
m,p-Xylene	10000	13	None	None	0.330 U	0.530 U	0.317 U
Methylene chloride	5	5	5	5	0.303 U	1.40 U	2.15 U
o-Xylene	10000	13	None	None	0.200 U	0.390 U	0.157 U
Styrene	10	10	100	100	0.190 U	0.530 U	0.224 U

Line of Evidence Objective 1b
Well Shaft Sampling
Chemistry Results
Drinking Water Sampling, JBPHH, Oahu Hawaii

					EPD	Shaft	Shaft
Tetrachloroethene (PCE)	5	5	5	5	0.180 U	0.410 U	0.125 U
Toluene	1000	9.8	1000	1000	0.294 U	0.390 U	0.120 U
trans-1,2-Dichloroethene	100	100	100	100	0.259 U	0.390 U	0.0958 U
trans-1,3-Dichloropropene	None	None	None	None	--	0.410 U	--
Trichloroethene (TCE)	5	5	5	5	0.180 U	0.260 U	0.0574 U
Vinyl chloride	2	2	2	2	0.180 U	0.220 U	0.611 U
Xylenes, Total	10000	13	10000	10000	--	0.530 U	--

Notes:

-- indicates that the sample was Not Analyzed for the analyte

Results highlighted yellow exceed the ISP
Results in purple font also exceed the EALs
Results in green font also exceed the DOH MCL
Results in blue font also exceed the EPA MCL

µg/L = Micrograms per Liter

1C

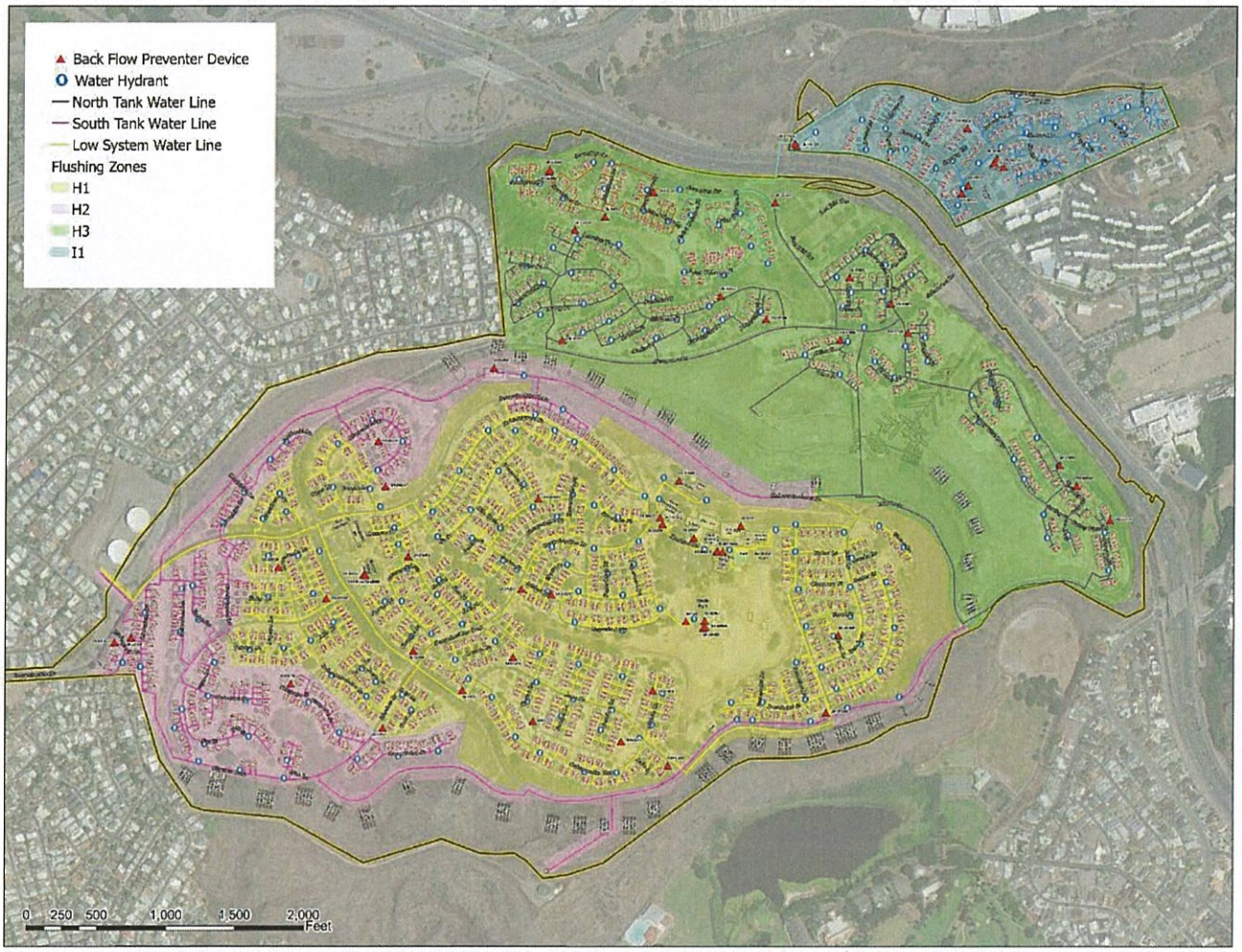
Table 1: Lines of Evidence Under Evaluation – Ensure no contamination is entering the water system.

Objective 1c - No additional contamination through the distribution system is occurring.

Incident Specific Criteria - Cross Connection Control investigation shows distribution system is protected, resulting in no additional sources of contamination.

Lines of Evidence	Completion Status	Outstanding Items	Notes
No contamination of the distribution system is occurring from cross-connections with other petroleum sources during this incident	Complete	Certification form with review of database.	Identify all facilities with petroleum activities (e.g., gas stations, motor pools, waste oil collection systems, ...). Navy shall submit a certification of an inventory database and/or map of non-classified facilities or records of documentation to ensure that backflow risks in those buildings/activities have been evaluated and addressed.
Cross Connection Control/Backflow Program-related documents	Complete	Copy of referenced document.	COMNAVREGHIINST 11330.2C, BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL PROGRAM.

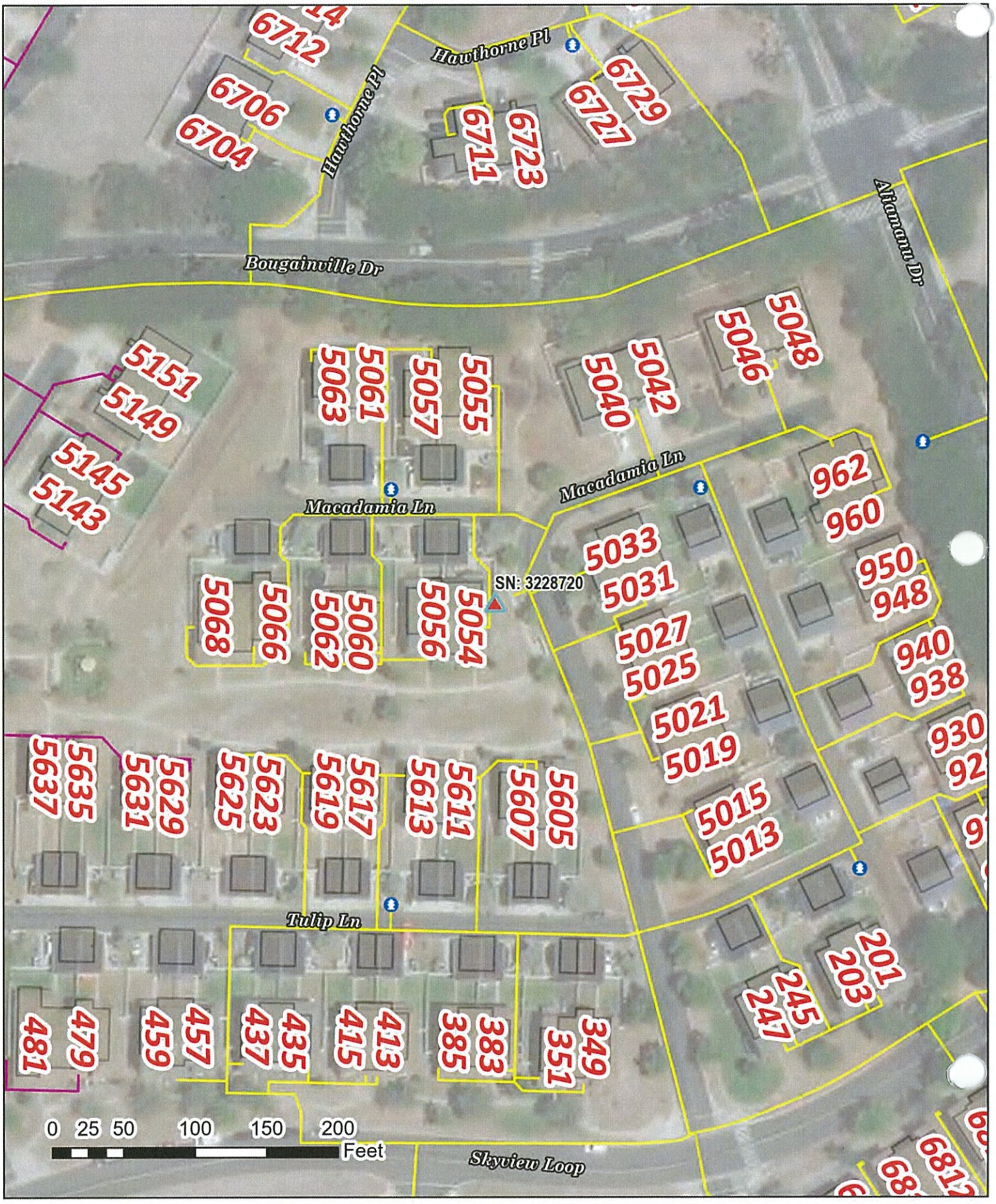
MAP OF ALL BACKFLOW DEVICES



RED HILL MAP OF BACKFLOW PREVENTERS

AMR-Red Hill Map of BFPAs.pdf

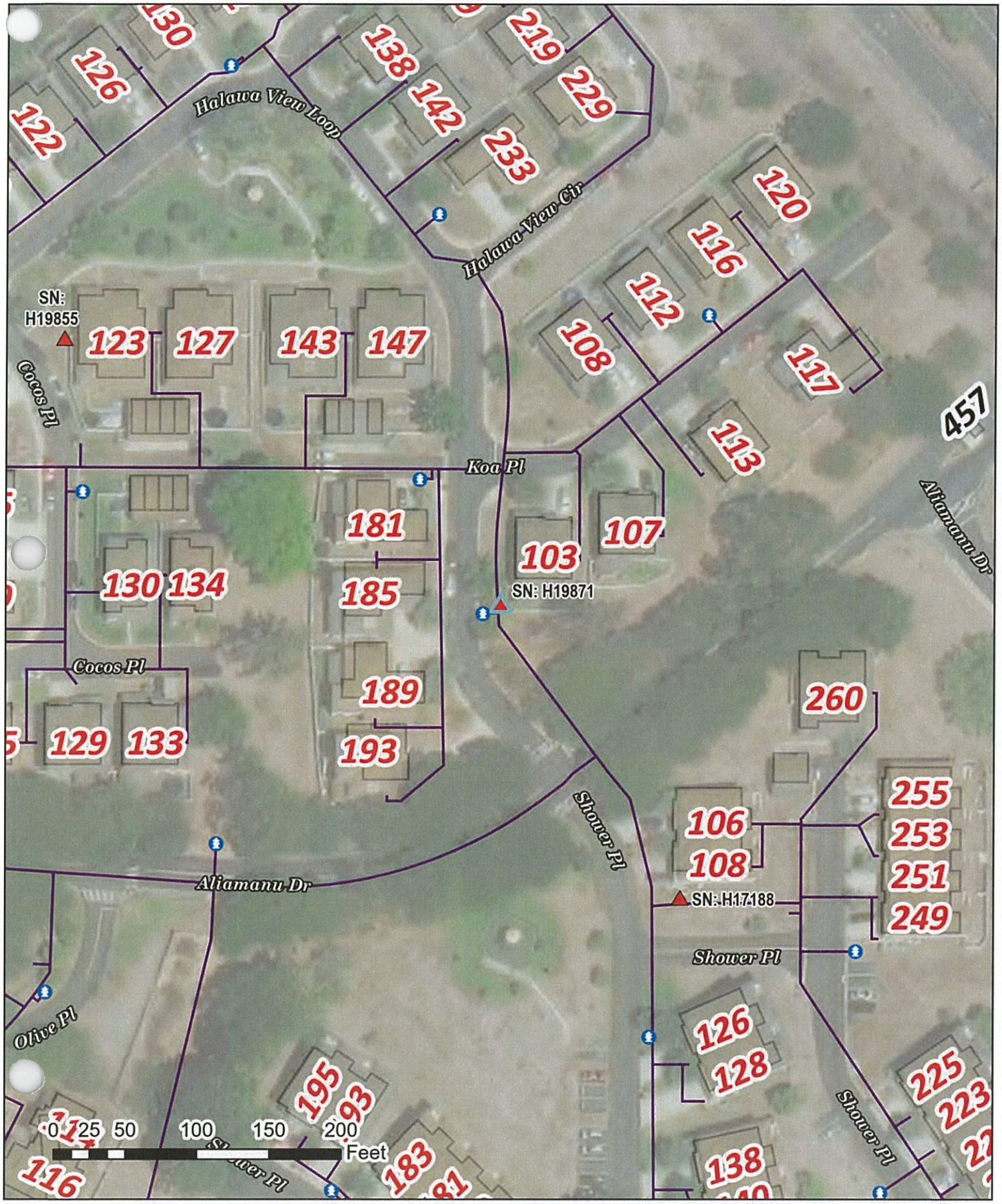
Back Flow Preventer: 5054 Macadamia Ln
BFPD SN: 3228720 Wilkins 975XL 2" RP (Irrigation)



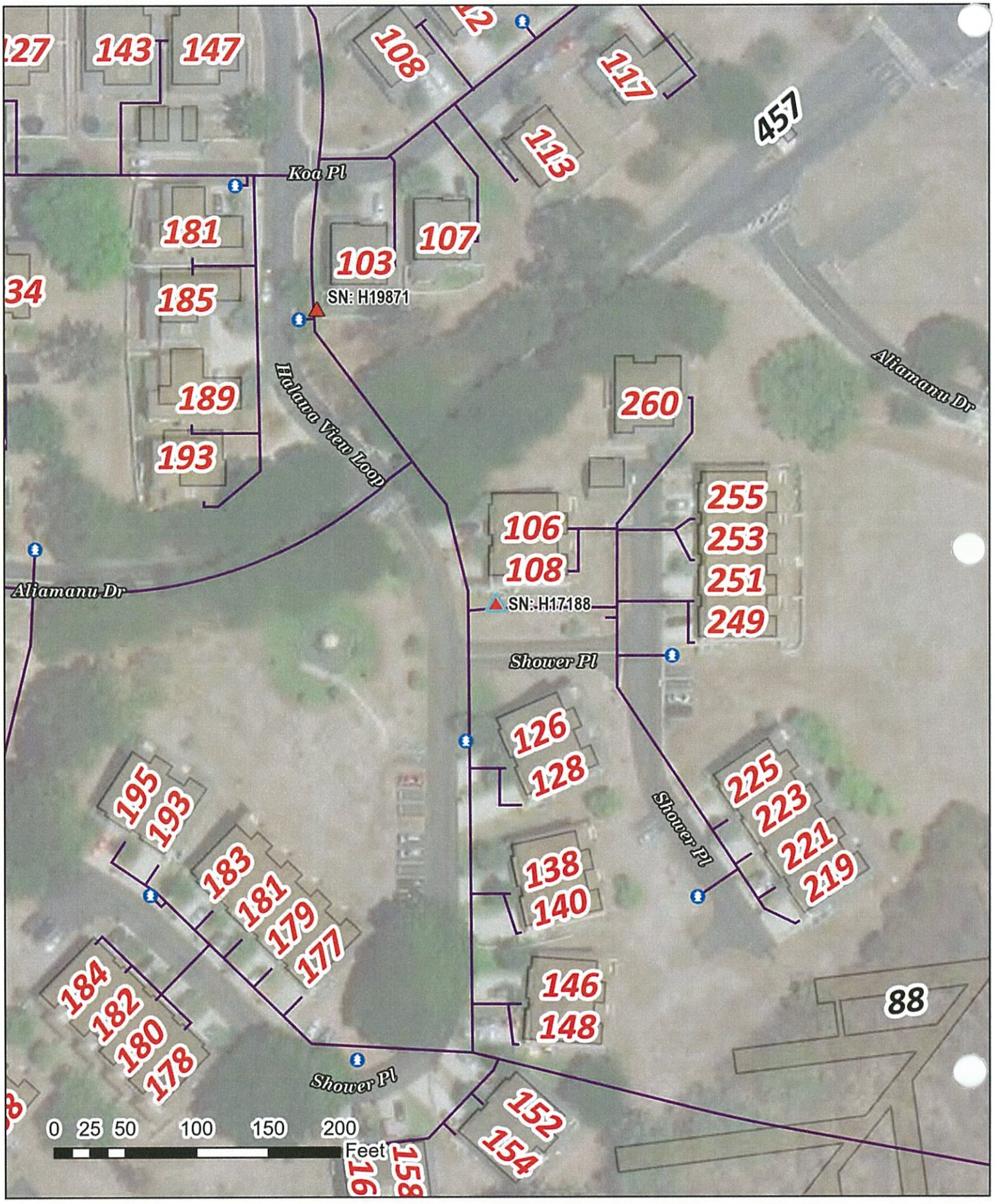
Back Flow Preventer: 5432 Mahogany Ln
BFPD SN: J015102 Febco 825Y 1.5" RP (Irrigation)

Back Flow Preventer: Red Hill Marque (Red Hill Community Center Left Side Next to BFPD SN: 4085392 Wilkins 975XL2 2" RP

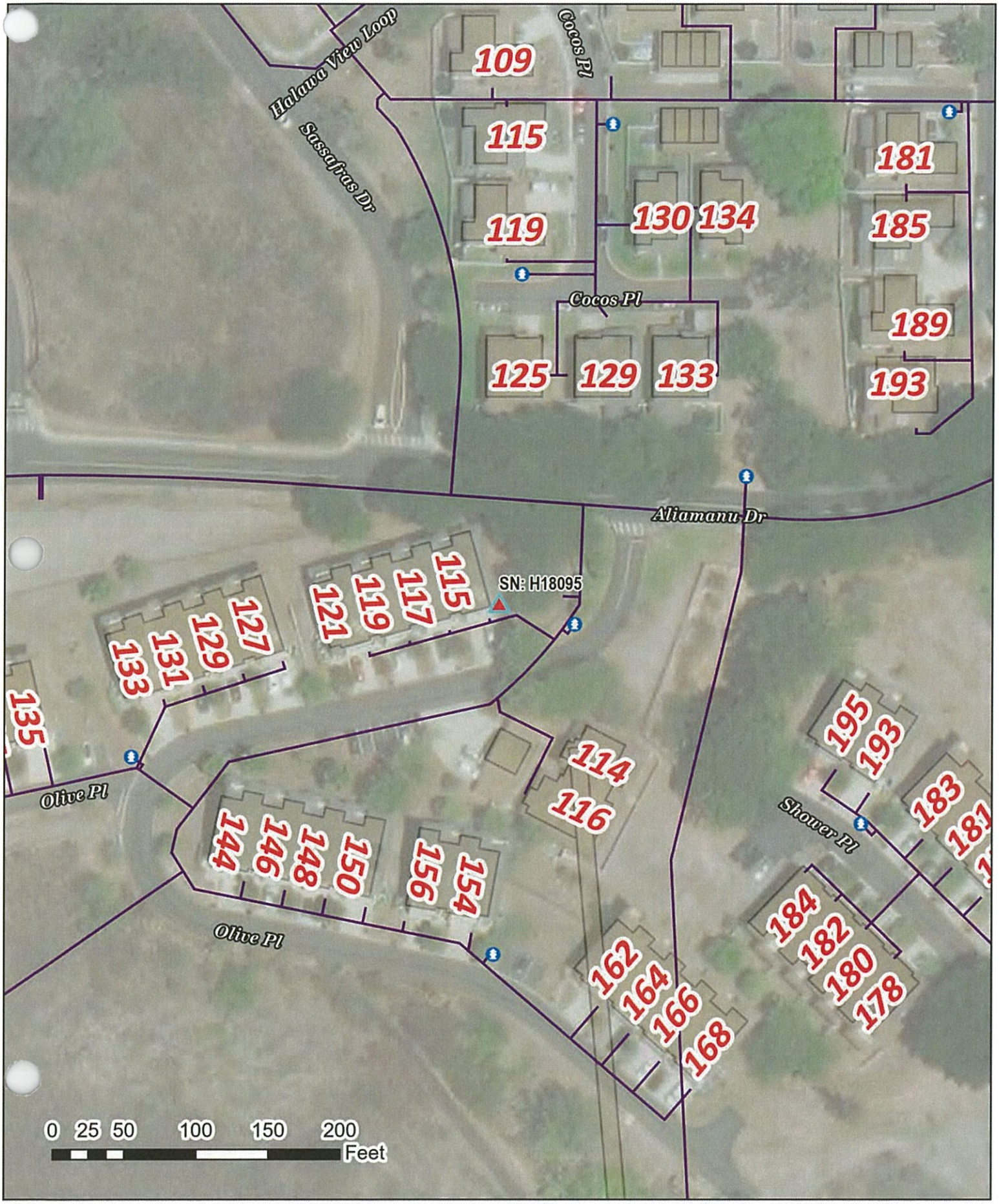
Back Flow Preventer: 103 Koa Pl St
BFPD SN: H19871 Febco 860 2" RP (Irrigation)



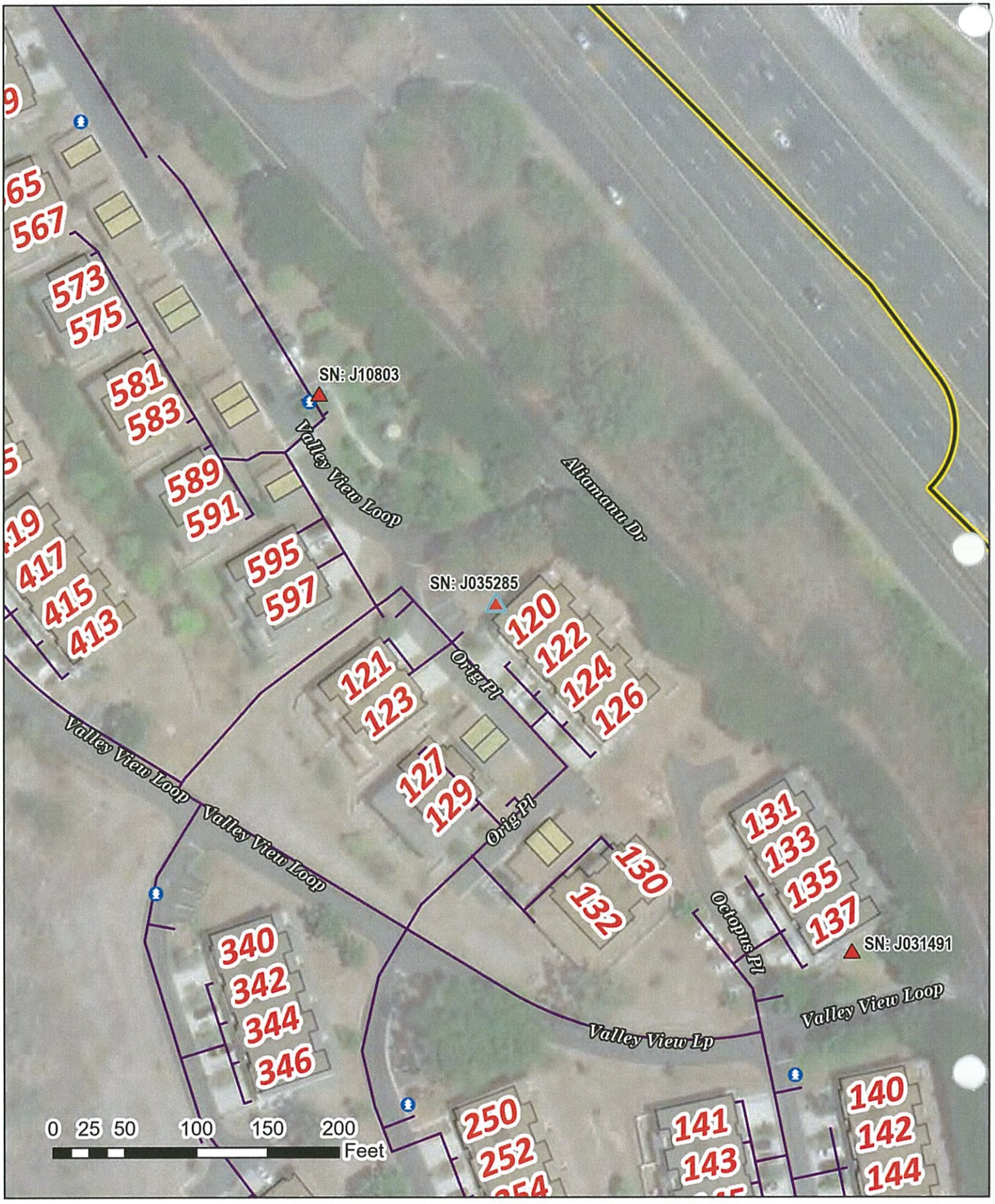
Back Flow Preventer: 108 Shower Pl
BFPD SN: H17188 Febco 860 2" RP (Irrigation)



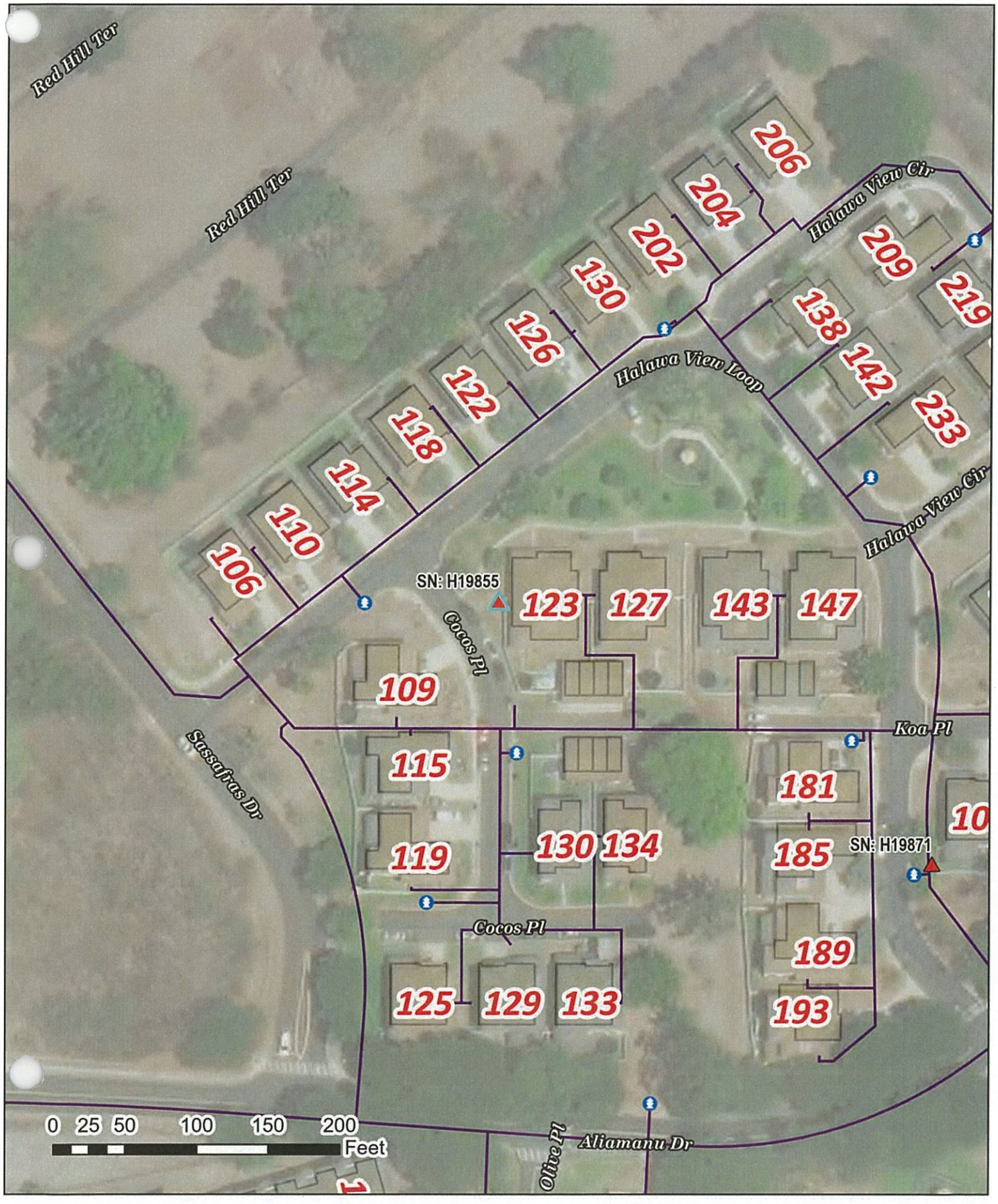
Back Flow Preventer: 115 Olive Pl
BFPD SN: H18095 Febco 860 2" RP (Irrigation)



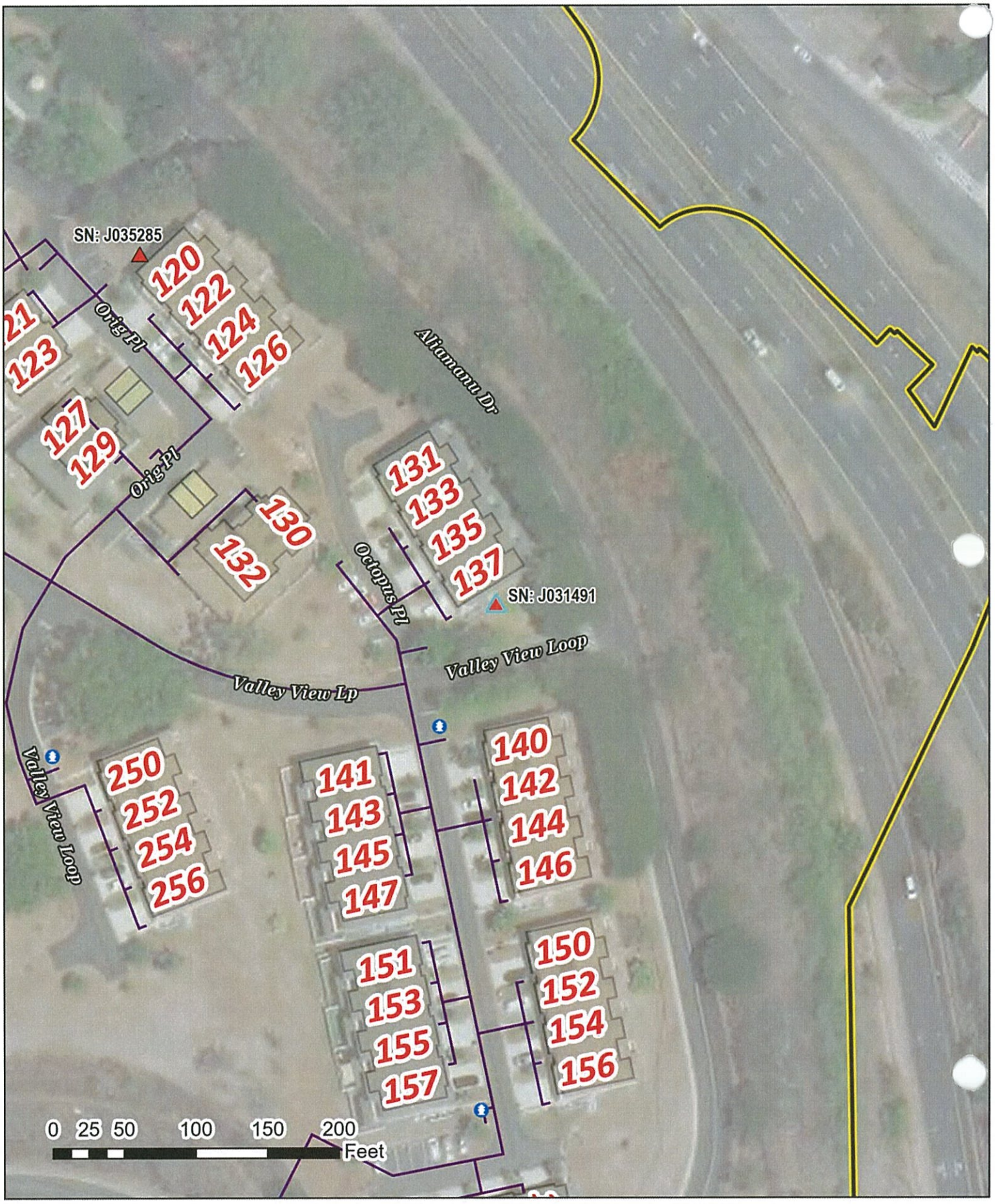
Back Flow Preventer: 120 Orig Pl
BFPD SN: J035285 Febco 825Y 2" RP (Irrigation)



Back Flow Preventer: 123 Cocos Pl St
BFPD SN: H19855 Febco 860 2" RP (Irrigation)



Back Flow Preventer: 137 Octopus Ln
BFPD SN: J031491 Febco 825Y 2" RP (Irrigation)



Back Flow Preventer: 140 Bogainviliea Lp
BFPD SN: 2775881 Wilkins 975XL 1" RP (Irrigation)

Back Flow Preventer: 1510 Buttonwood Pl
BFPD SN: 143170 Apollo RP40 1.25" RP (Irrigation)

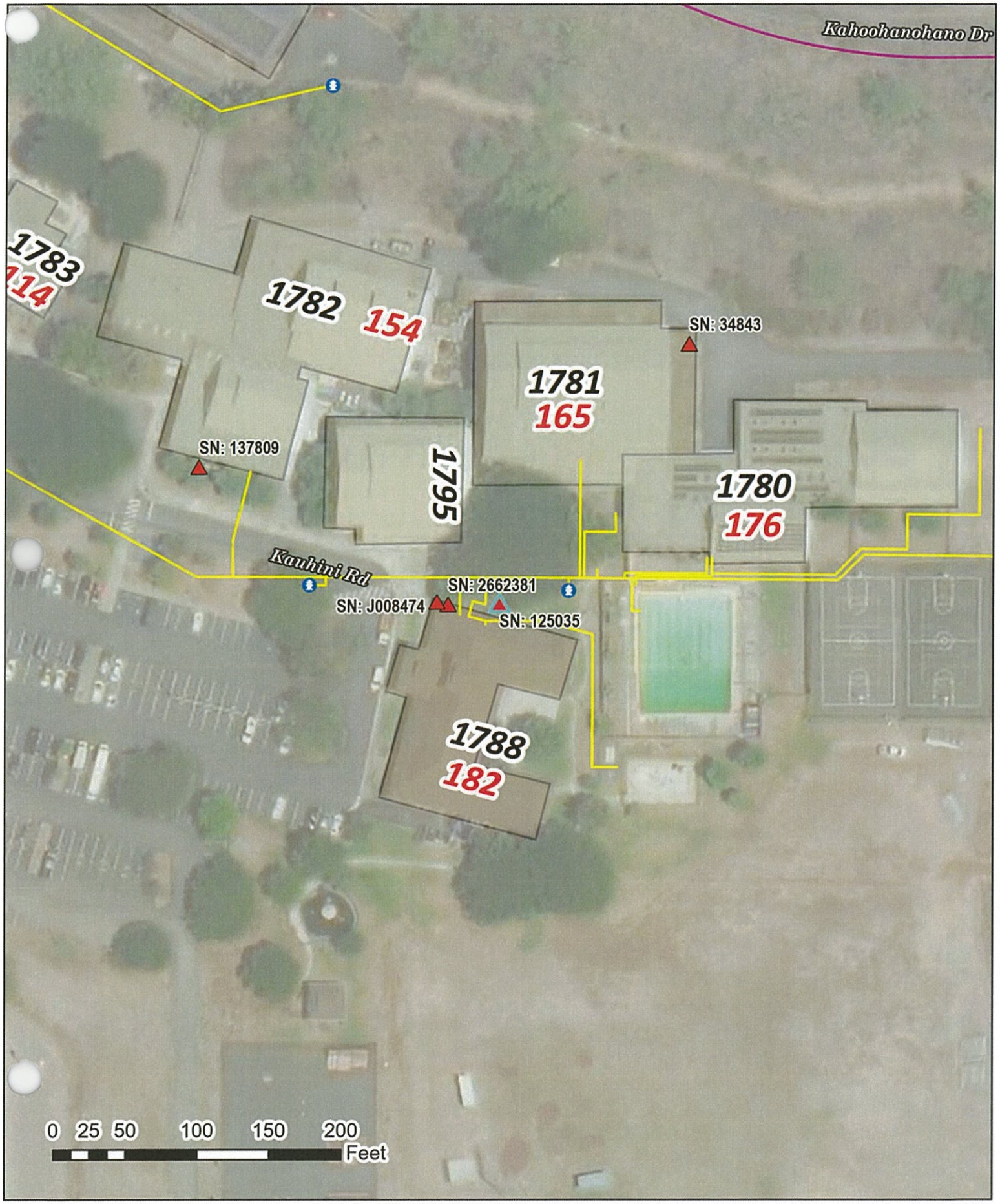
Back Flow Preventer: 1646 Cowslip Ln
BFPD SN: 192664 Apollo RP40 2" RP (Irrigation)

Back Flow Preventer: 174 Poinciana Pl
BFPD SN: H21300 Febco 860 2" RP (Irrigation)

Back Flow Preventer: 1788
BFPD SN: 2662381Wilkins 975XL 1.5" RP

Back Flow Preventer: 1788 Left Side of AMR Community Center
BFPD SN: J008474 Febco 860 2" RP

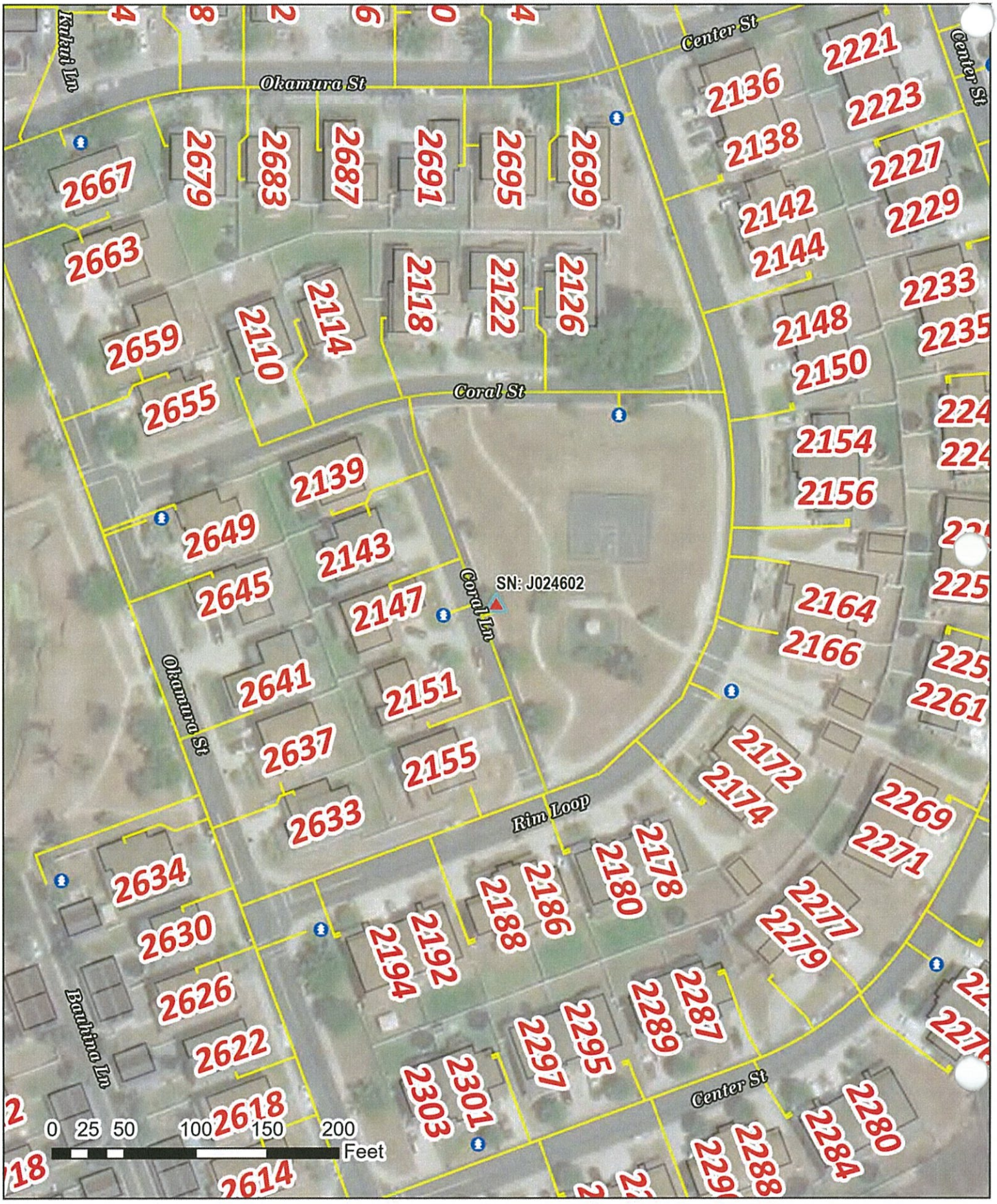
Back Flow Preventer: 1788 Left Side of AMR Community Center
BFPD SN: 125035 Watts 909 2.5" RP



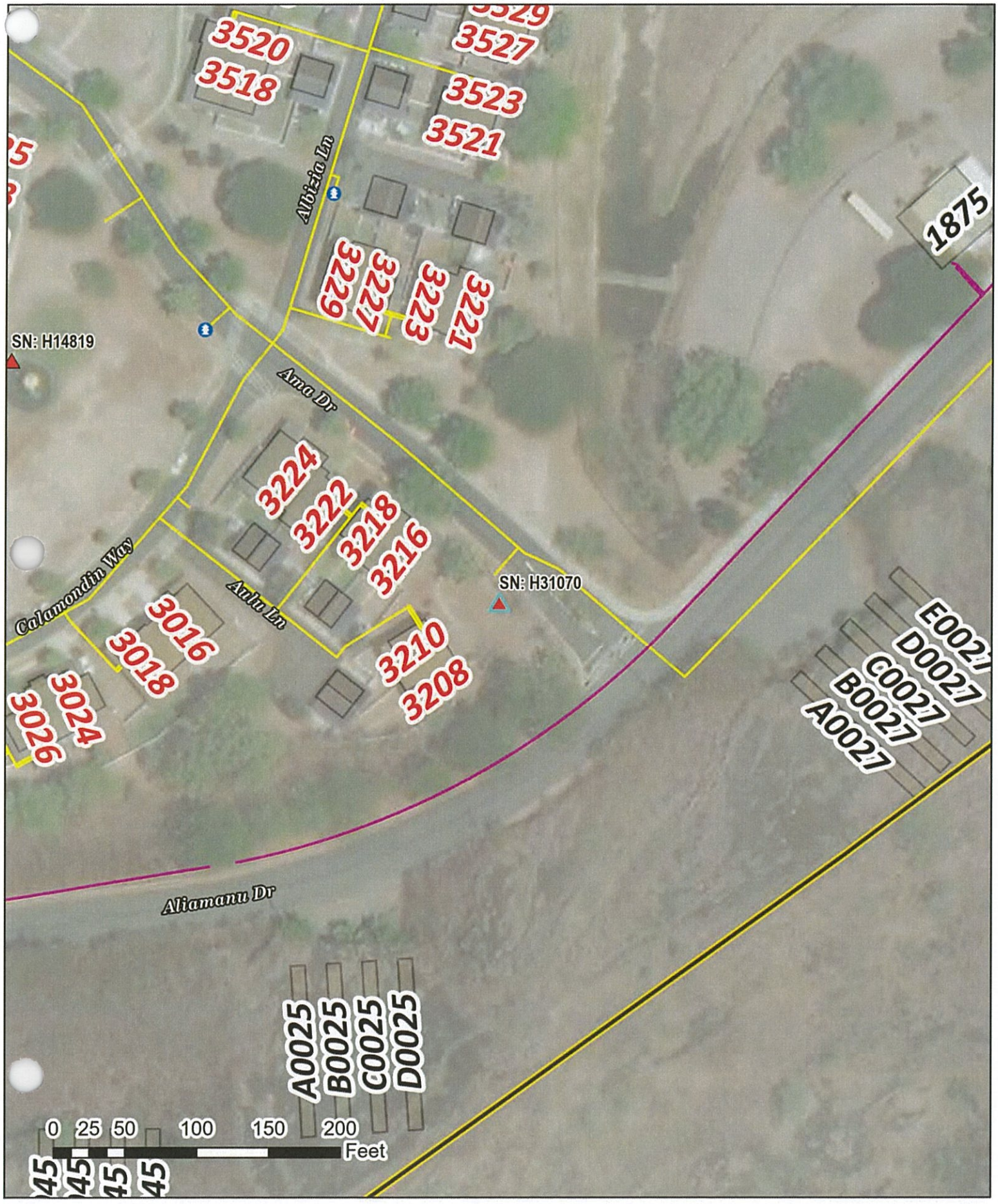
Back Flow Preventer: 1901 Point Welcome Pl
BFPD SN: H18084 Febco 860 2" RP (Irrigation)

Back Flow Preventer: 199 Justicia Pl
BFPD SN: H21307 Febco 860 2" RP (Irrigation)

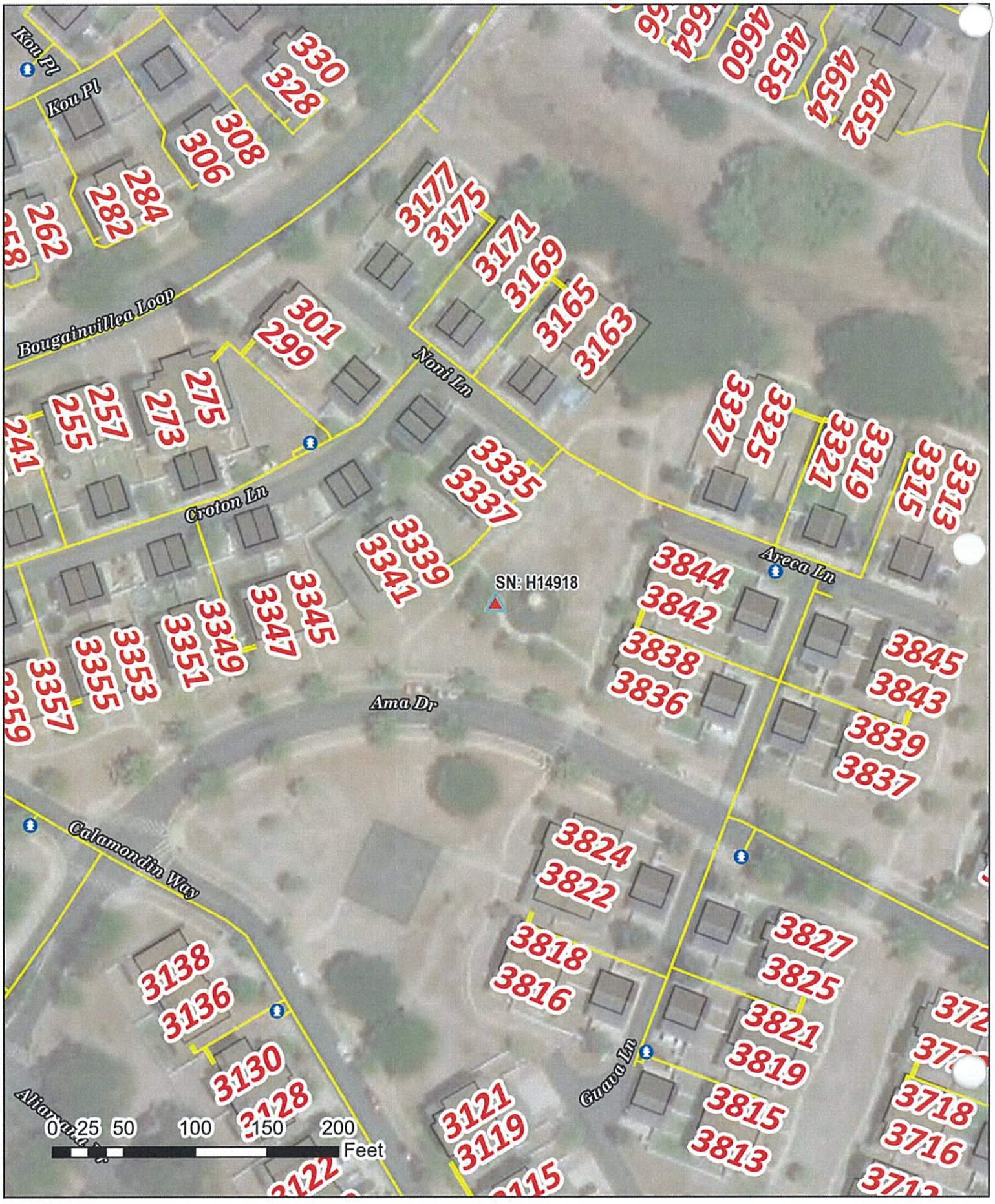
Back Flow Preventer: 2147 Coral Ln
BFPD SN: J024602 Febco 825Y 2" RP (Irrigation)



Back Flow Preventer: 3210 Aulu Ln
BFPD SN: H31070 Febco 860 1" RP (Irrigation)



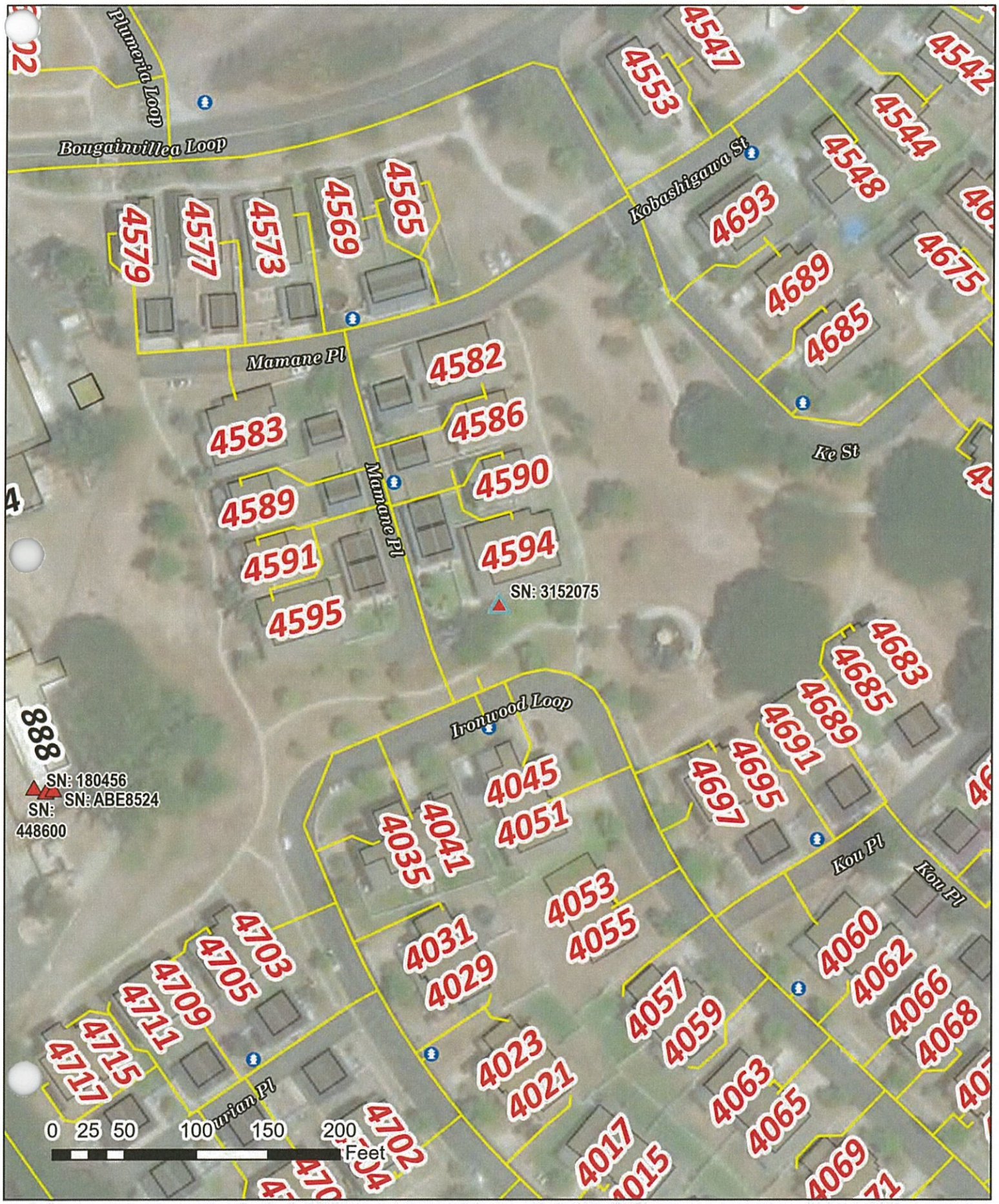
Back Flow Preventer: 3339 Croton Ln
BFPD SN: H14918 Febco 860 2" RP (Irrigation)



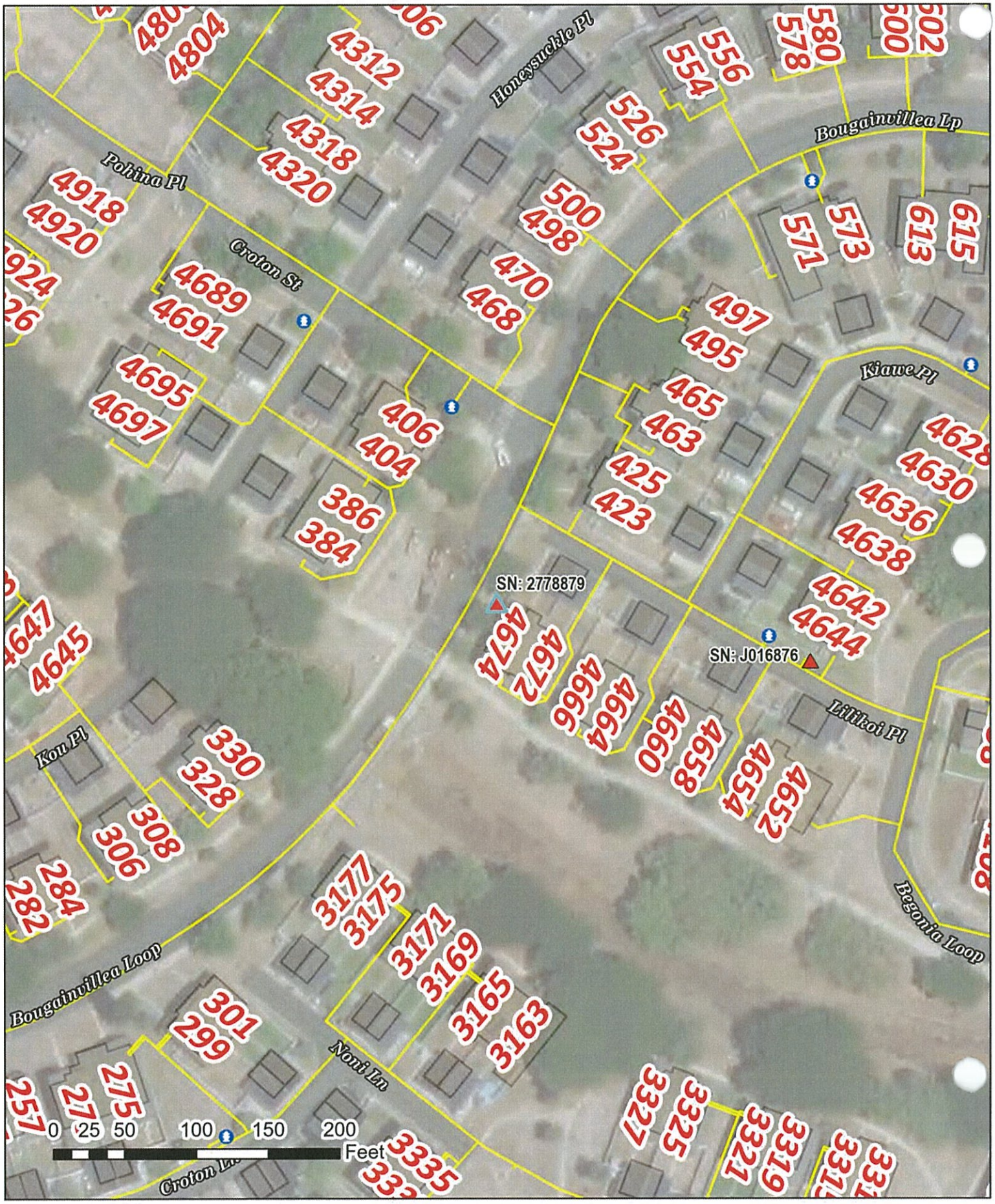
Back Flow Preventer: 3534 Albizia Ln
BFPD SN: H14818 Febco 860 2" RP (Irrigation)

Back Flow Preventer: 3617 Bamboo Ln
BFPD SN: H14819 Febco 860 2" RP (Irrigation)

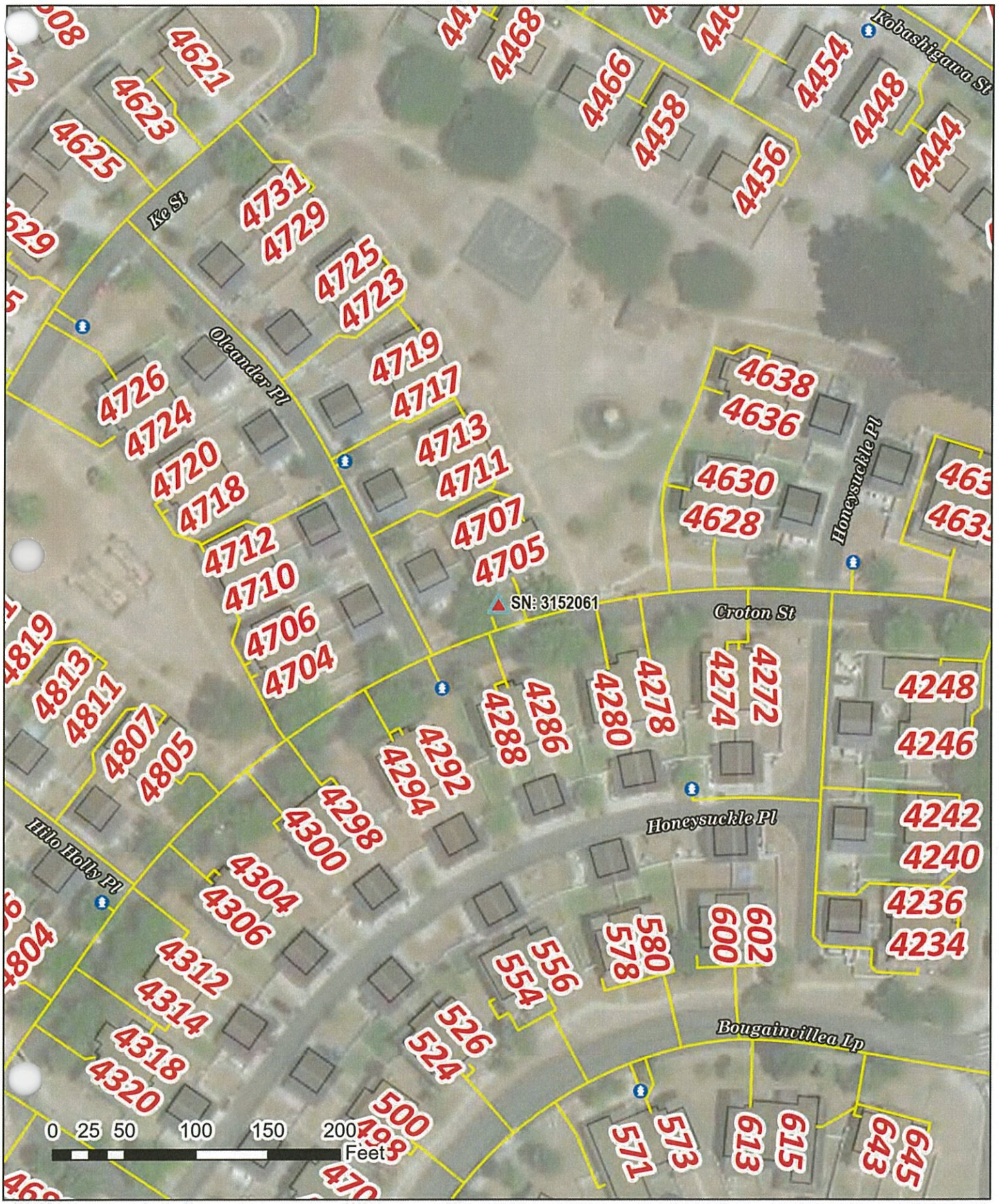
Back Flow Preventer: 4594 Mamane Ln
BFPD SN: 3152075 Wilkins 975XL 2" RP (Irrigation)



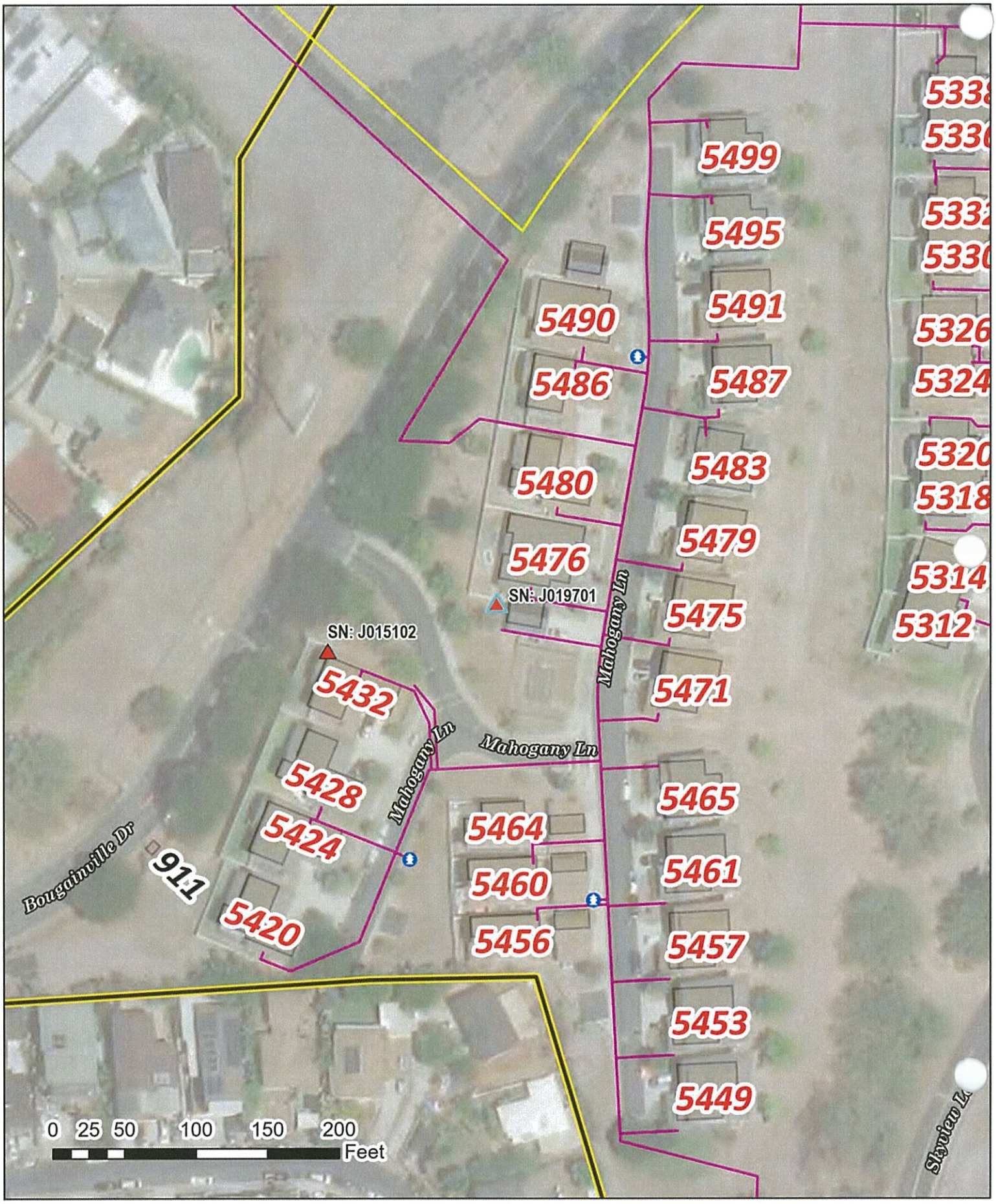
Back Flow Preventer: 4674 Lilikoi Ln
BFPD SN: 2778879 Wilkins 975XL 1" RP (Irrigation)



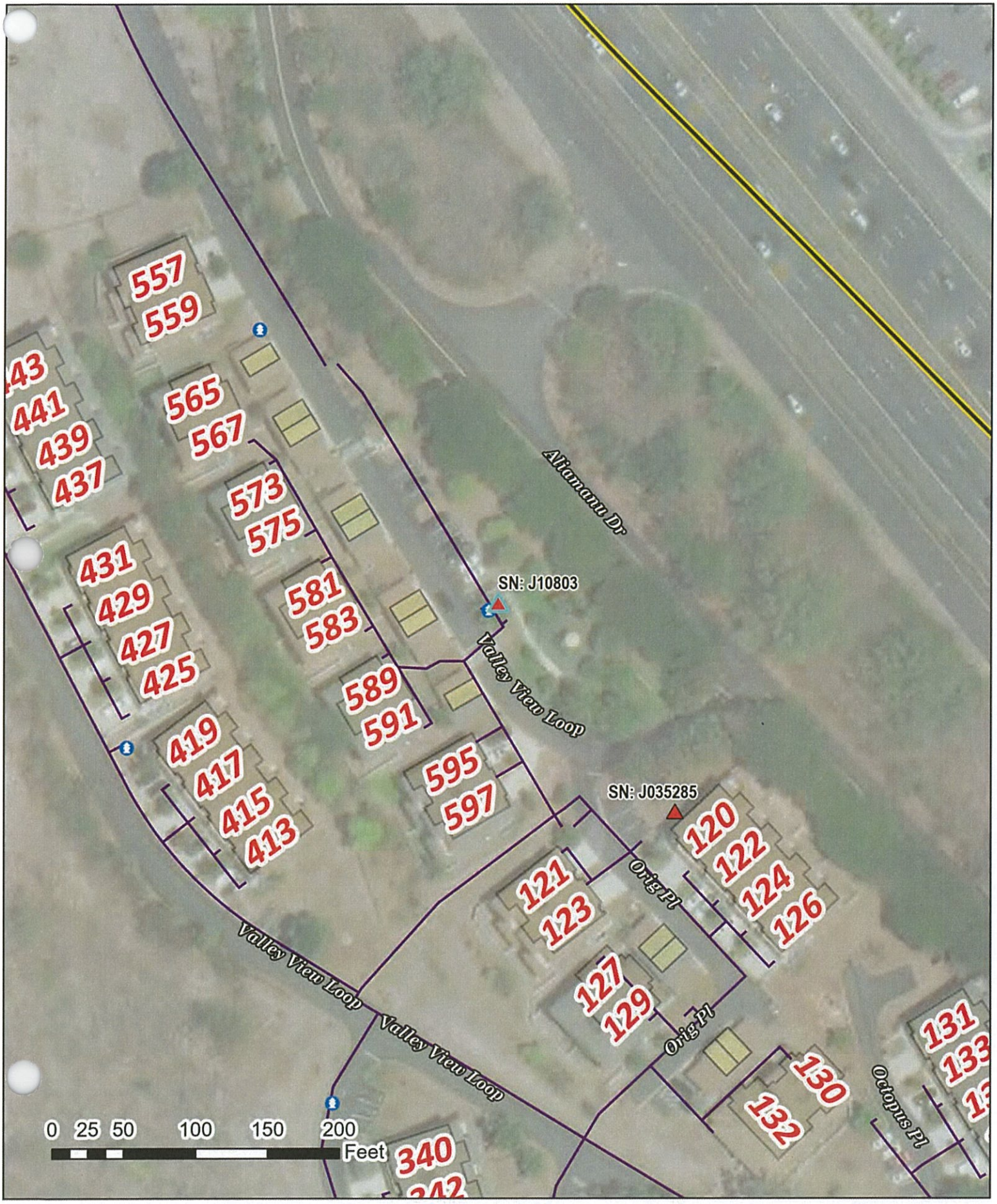
Back Flow Preventer: 4705 Oleander St
BFPD SN: 3152061 Wilkins 975XL 2" RP (Irrigation)



Back Flow Preventer: 5476 Mahogany Ln
BFPD SN: J019701 Febco 825Y 2" RP (Irrigation)

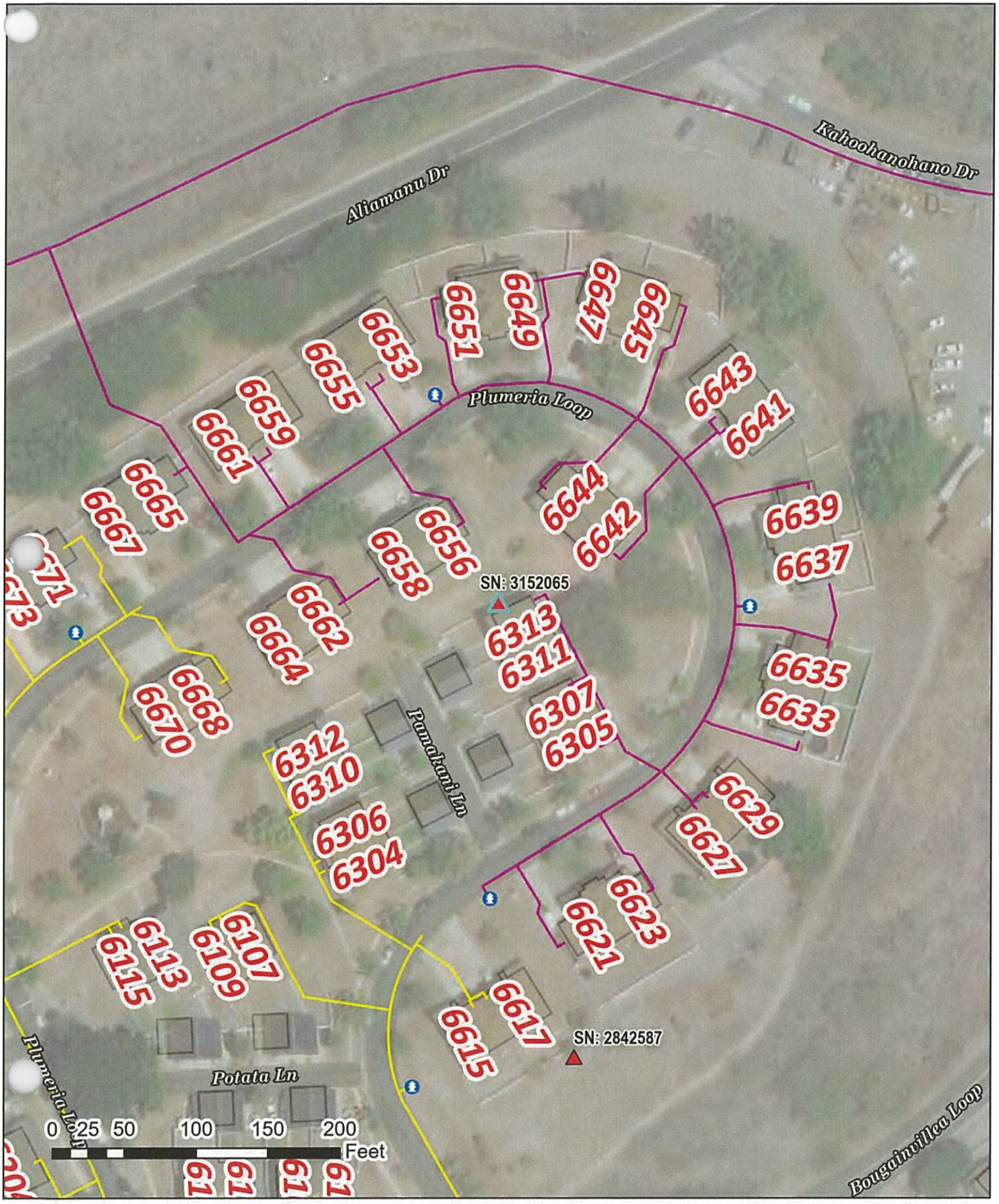


Back Flow Preventer: 589 Valley View Loop
BFPD SN: J10803 Febco 860 2" RP (Irrigation)

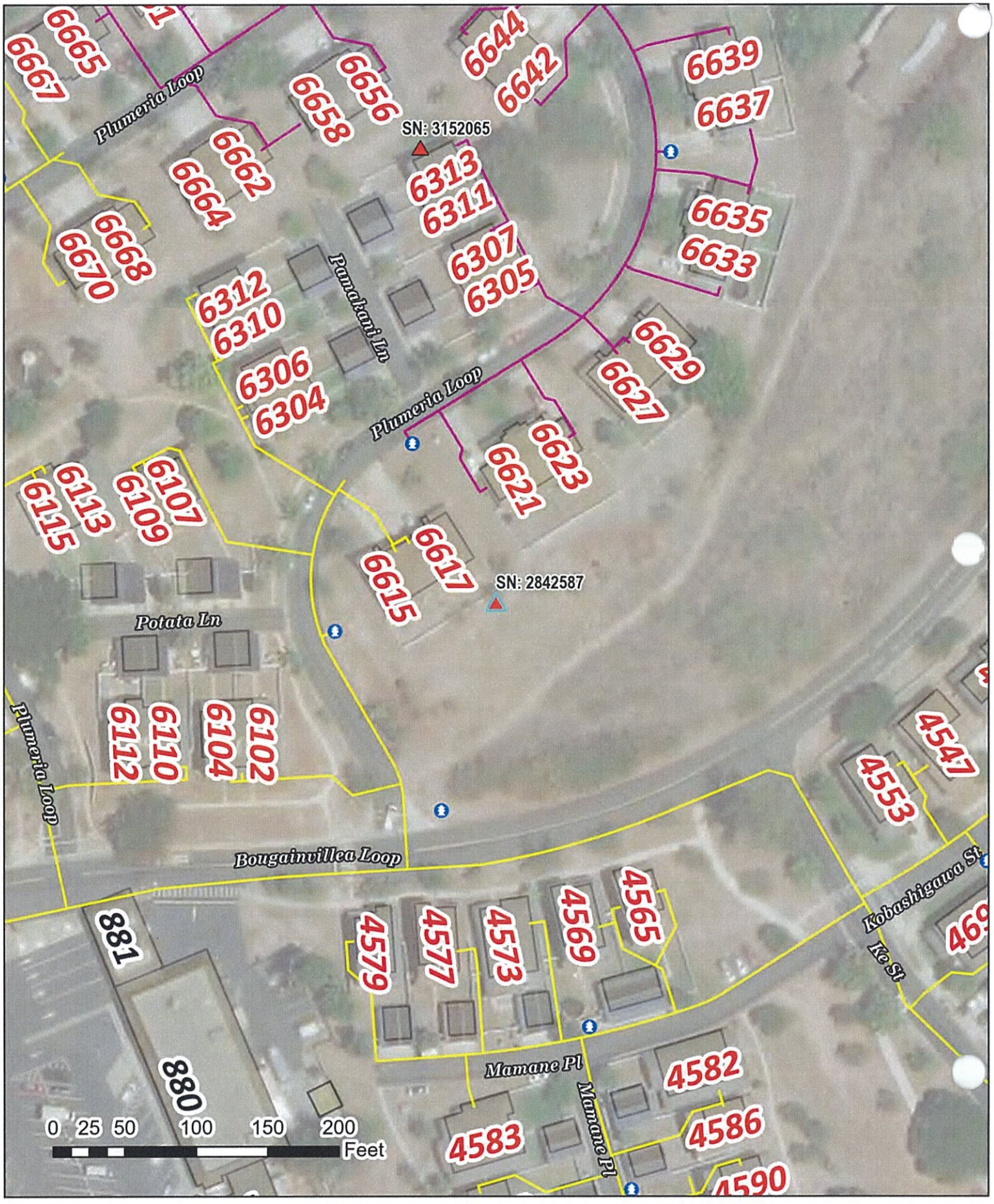


Back Flow Preventer: 6258 Naupaka St
BFPD SN: 230170 Apollo RP40 2" RP (Irrigation)

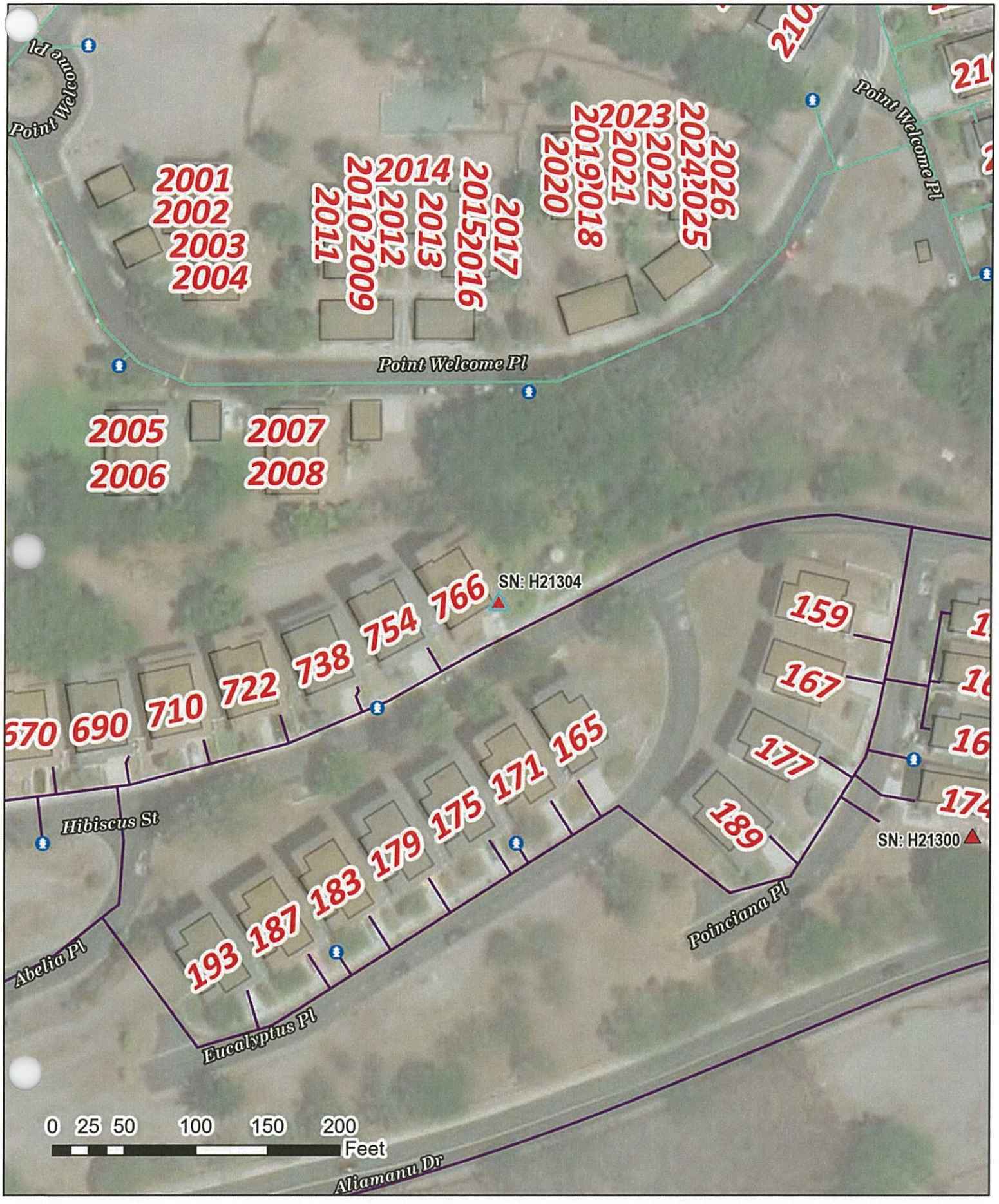
Back Flow Preventer: 6313 Pamakani Ln 2"
BFPD SN: 3152065 Wilkins 975XL RP (Irrigation)



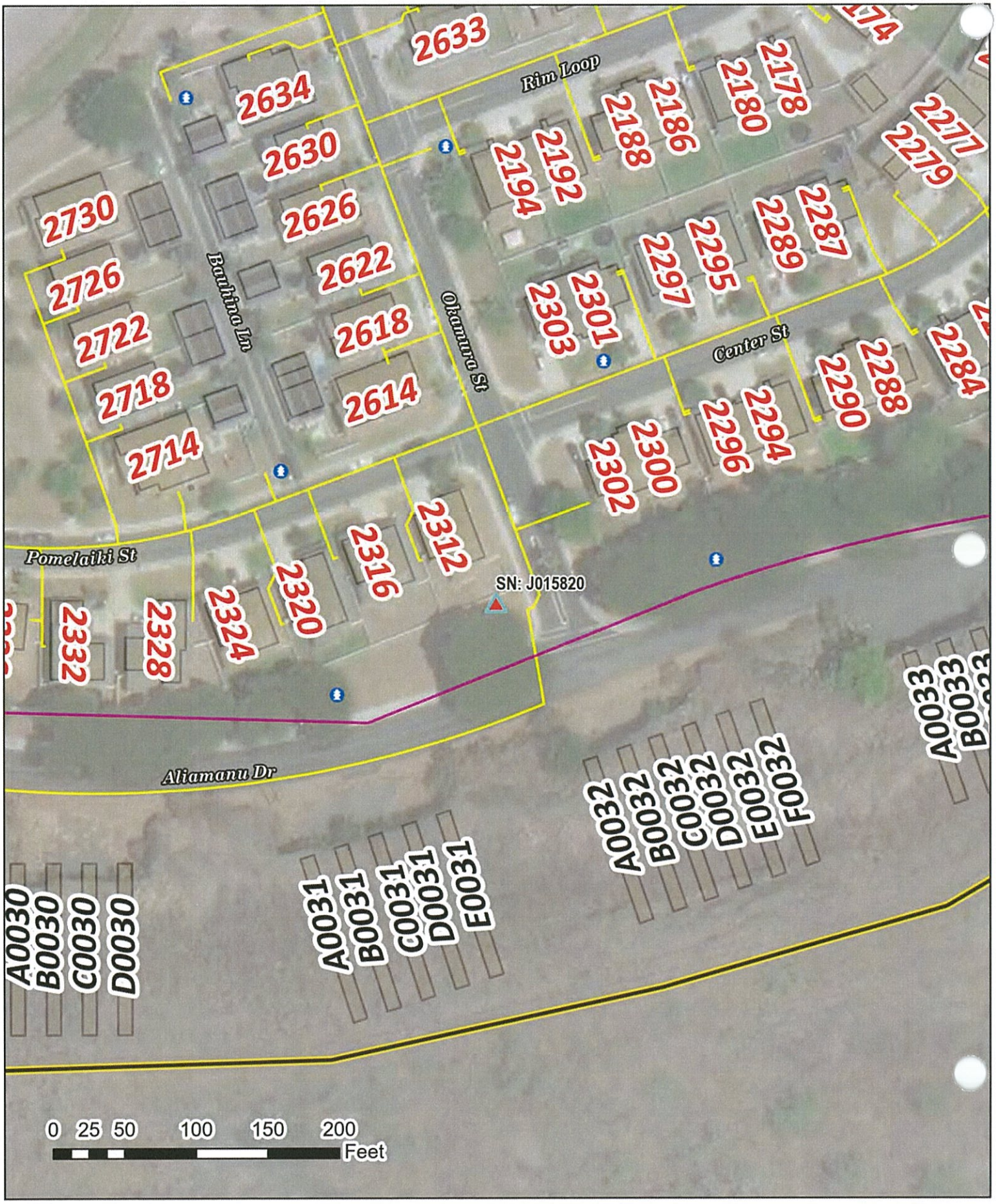
Back Flow Preventer: 6617 Plumeria Lp 2"
BFPD SN: 2842587 Wilkins 975XL RP (Irrigation)



Back Flow Preventer: 766 Hibiscus St
BFPD SN: H21304 Febco 860 2" RP (Irrigation)

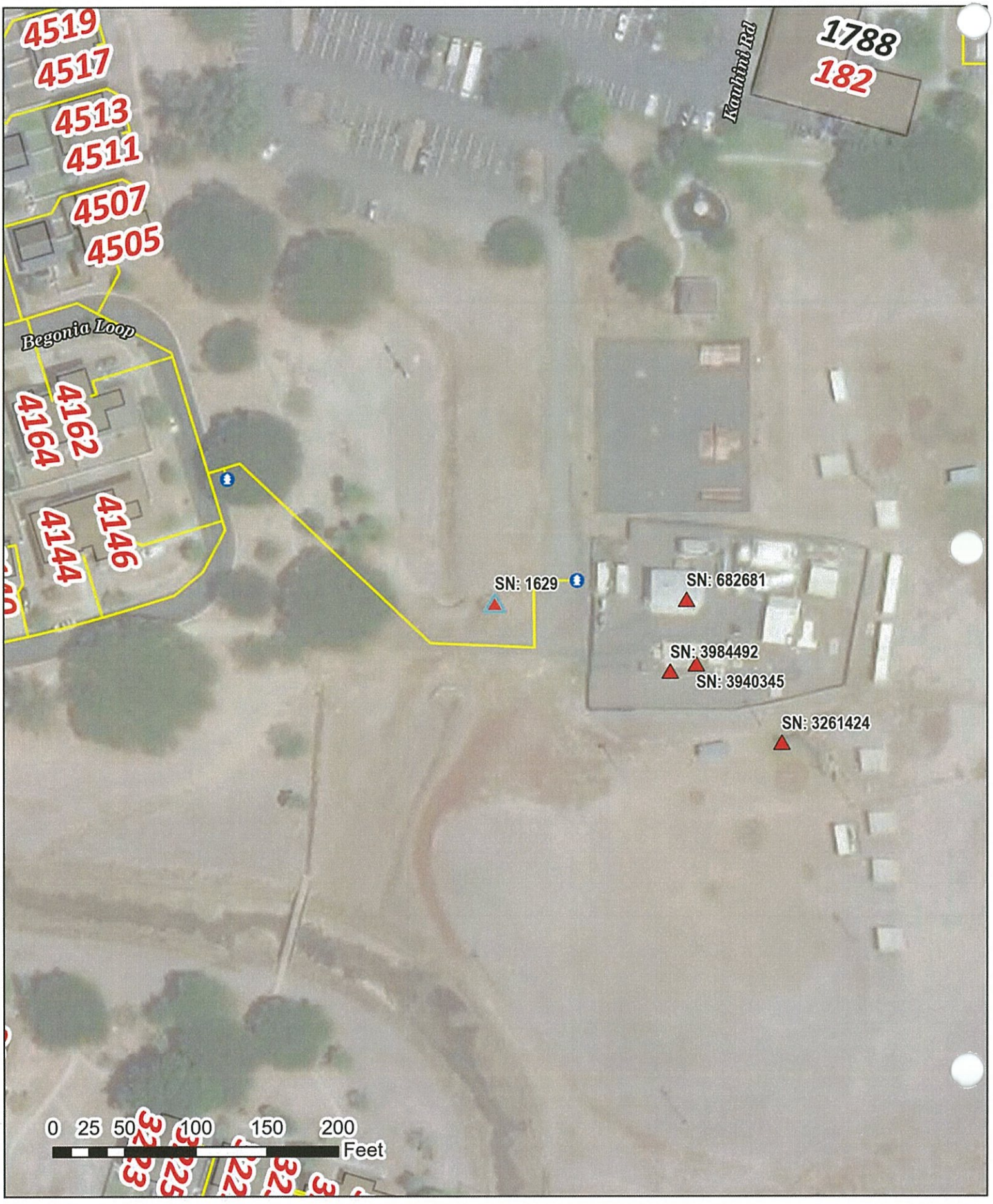


Back Flow Preventer: Aliamanu and Okamura St (Back of 2312 Pomelaika St)
BFPD SN: J015820 Febco 815Y 1.5" RP (Irrigation)

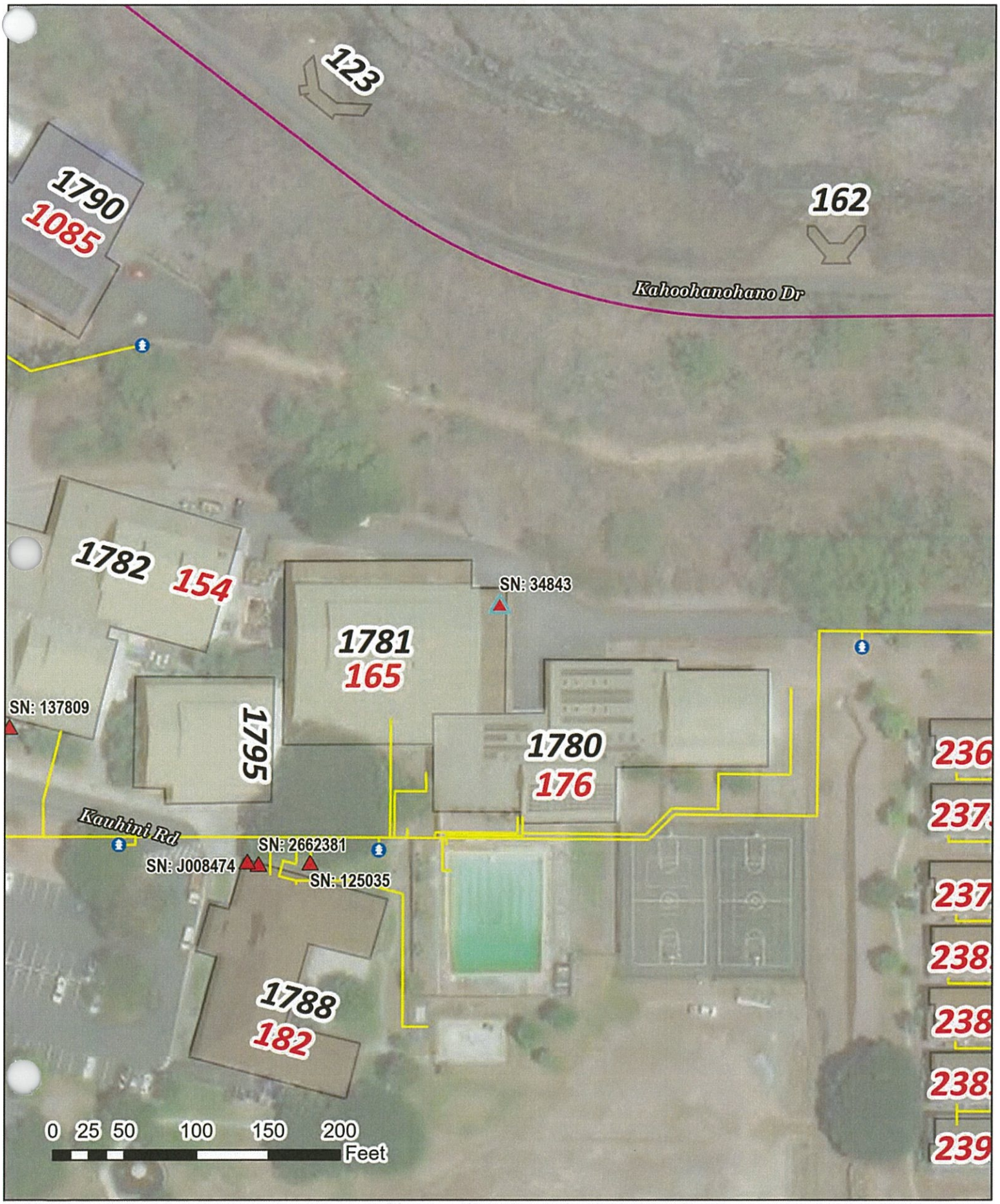


Back Flow Preventer: Ama and Aliamanu
BFPD SN: H3015 Febco 860 2" RP (Irrigation)

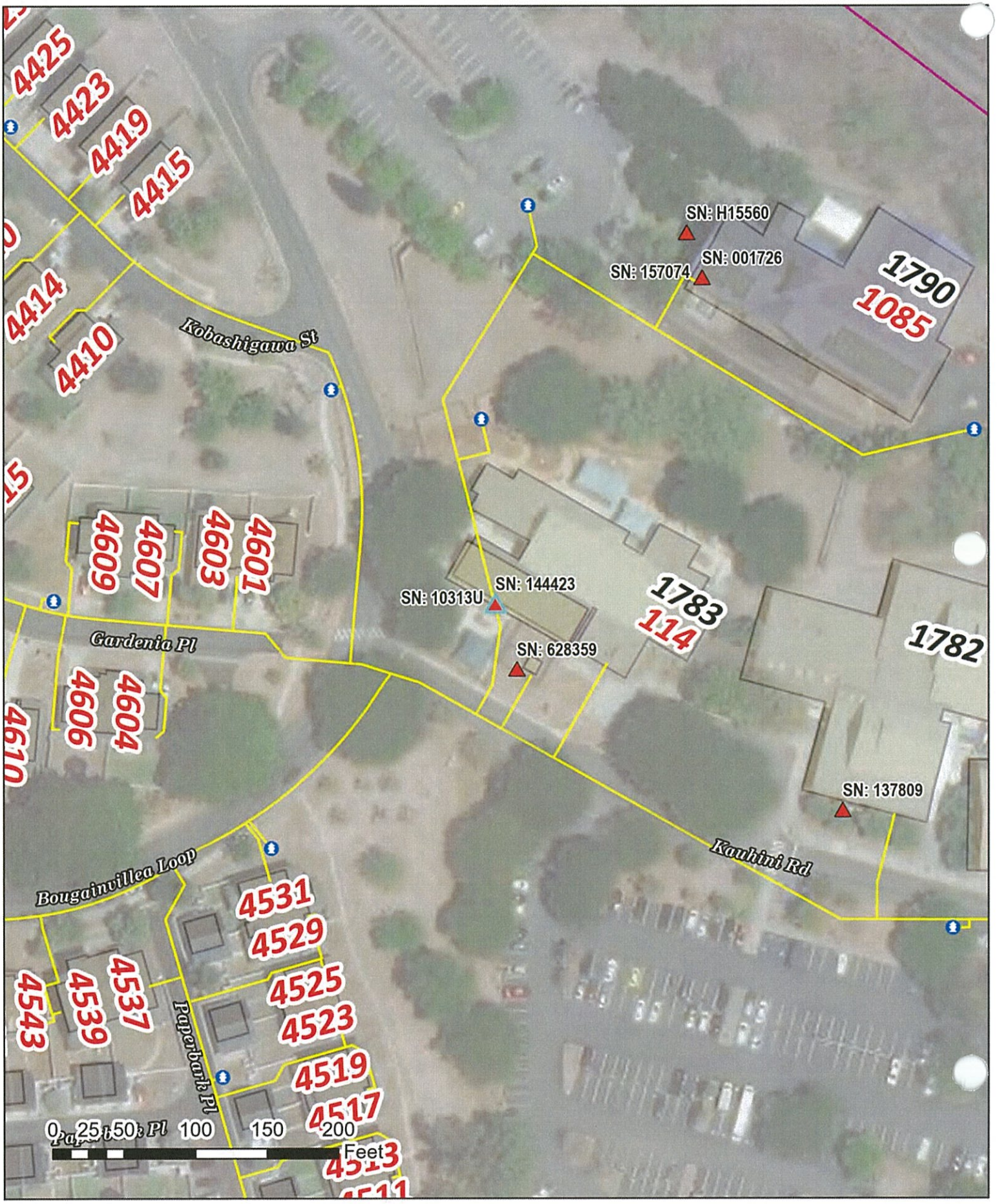
Back Flow Preventer: AMR 84210
BFPD SN: 1629 Febco 975 6" RP (Irrigation)



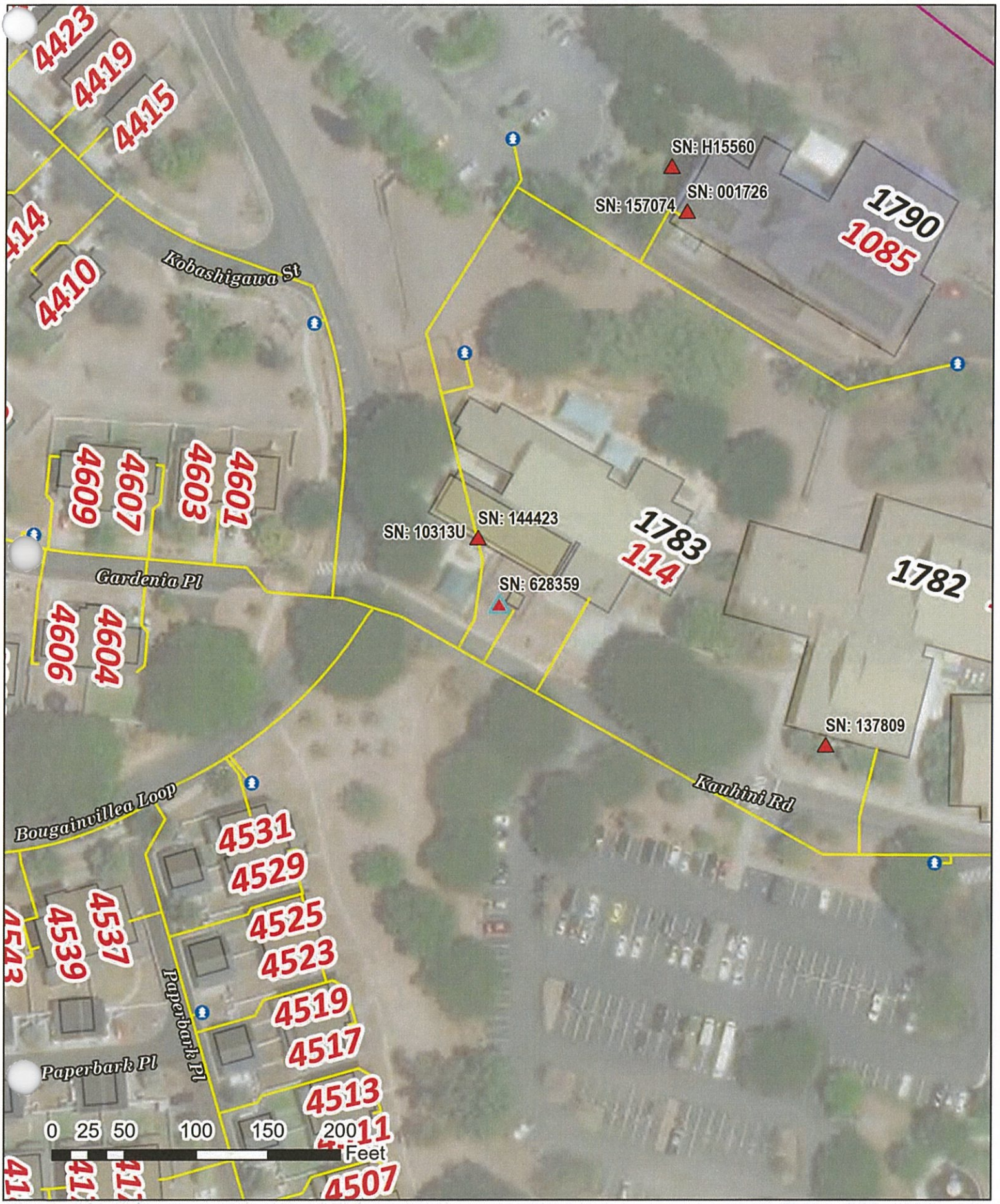
Back Flow Preventer: AMR Bldg 1781
BFPD SN: 34843 Ames 2000SS 1" RP (Fire)



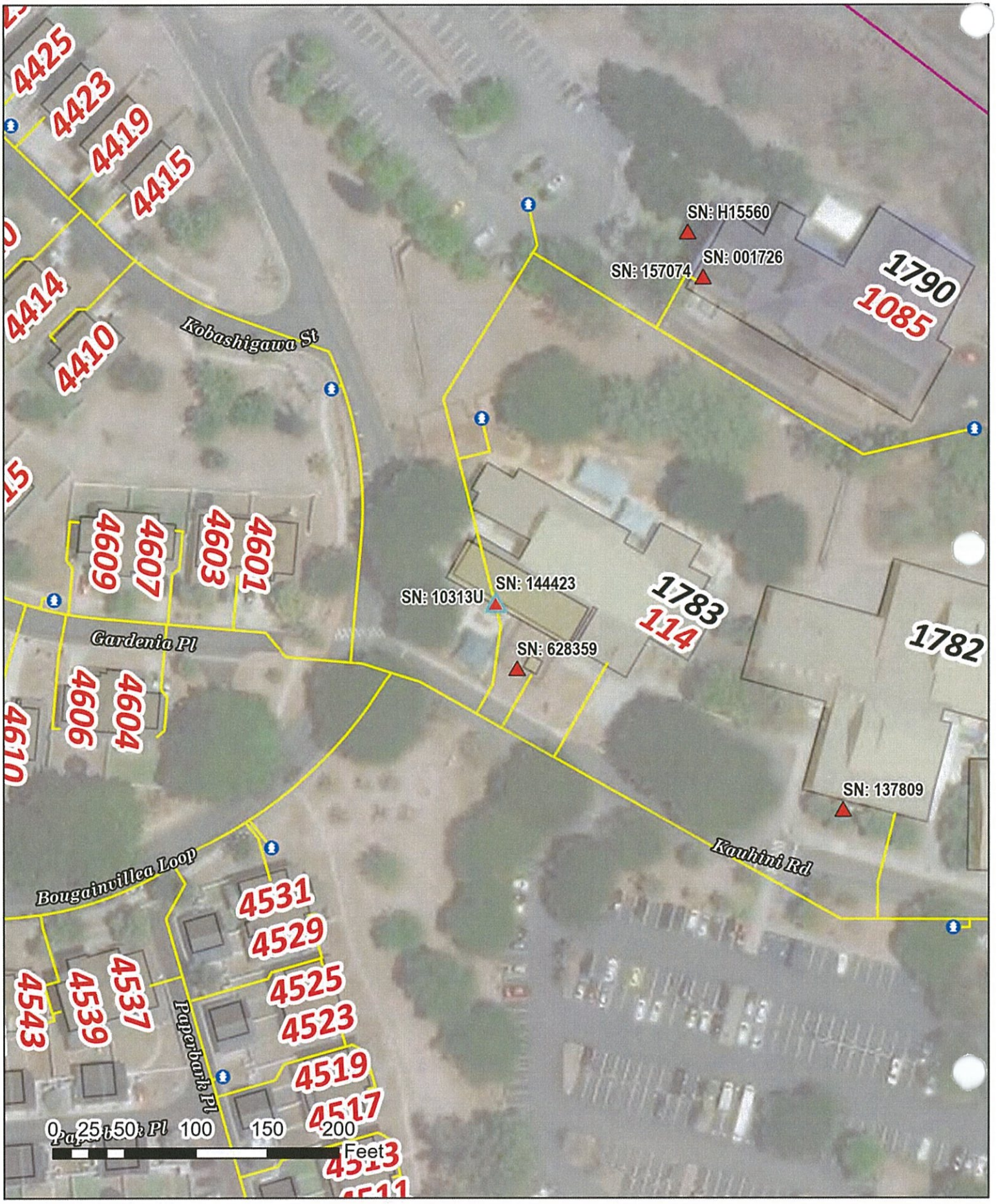
Back Flow Preventer: AMR Bldg 1783
BFPD SN: 144423 Watts 709 4" DCDA (Fire)



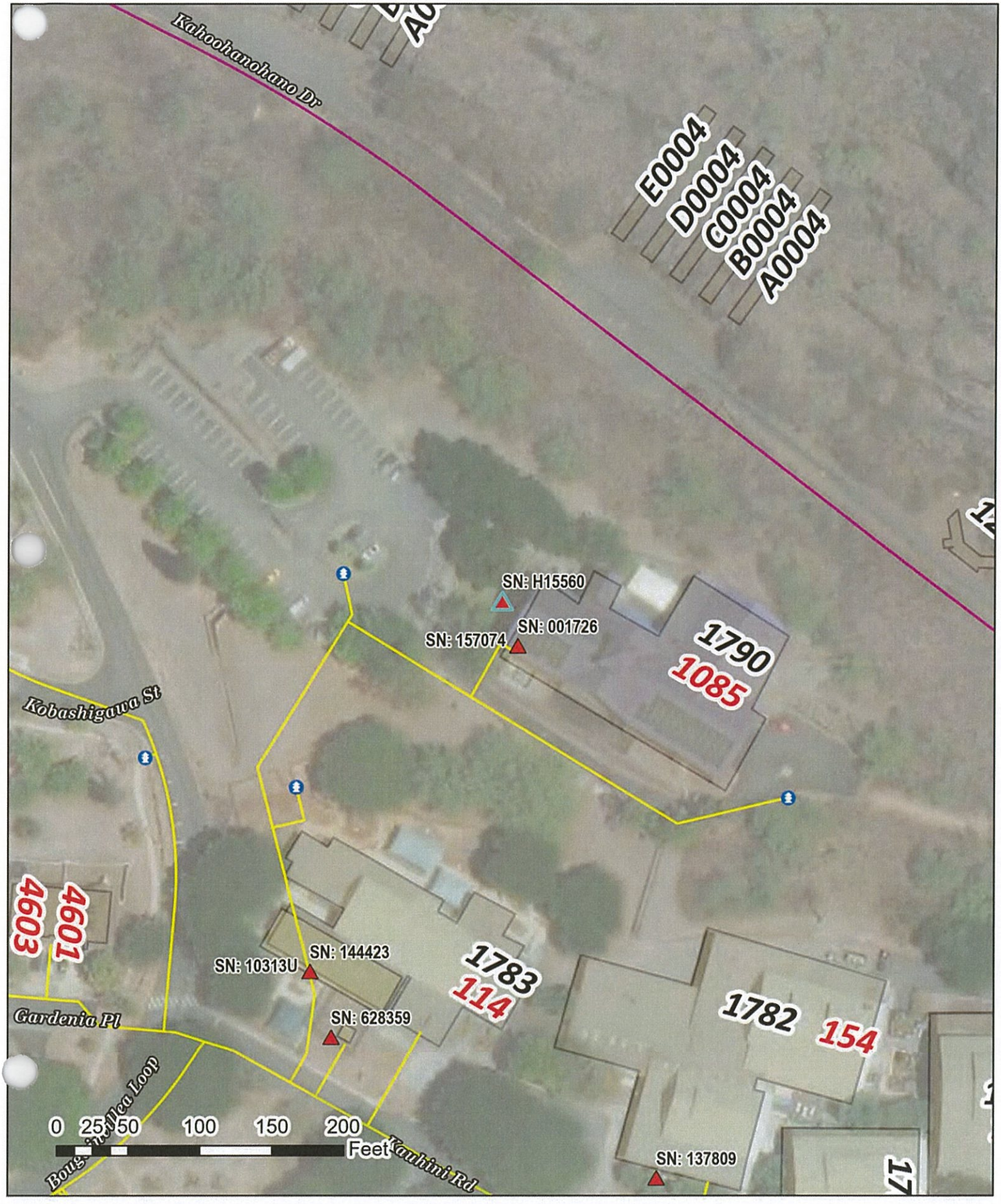
Back Flow Preventer: AMR Bldg 1783
BFPD SN: 628359 Watts 909 1" RP (Chill Water)



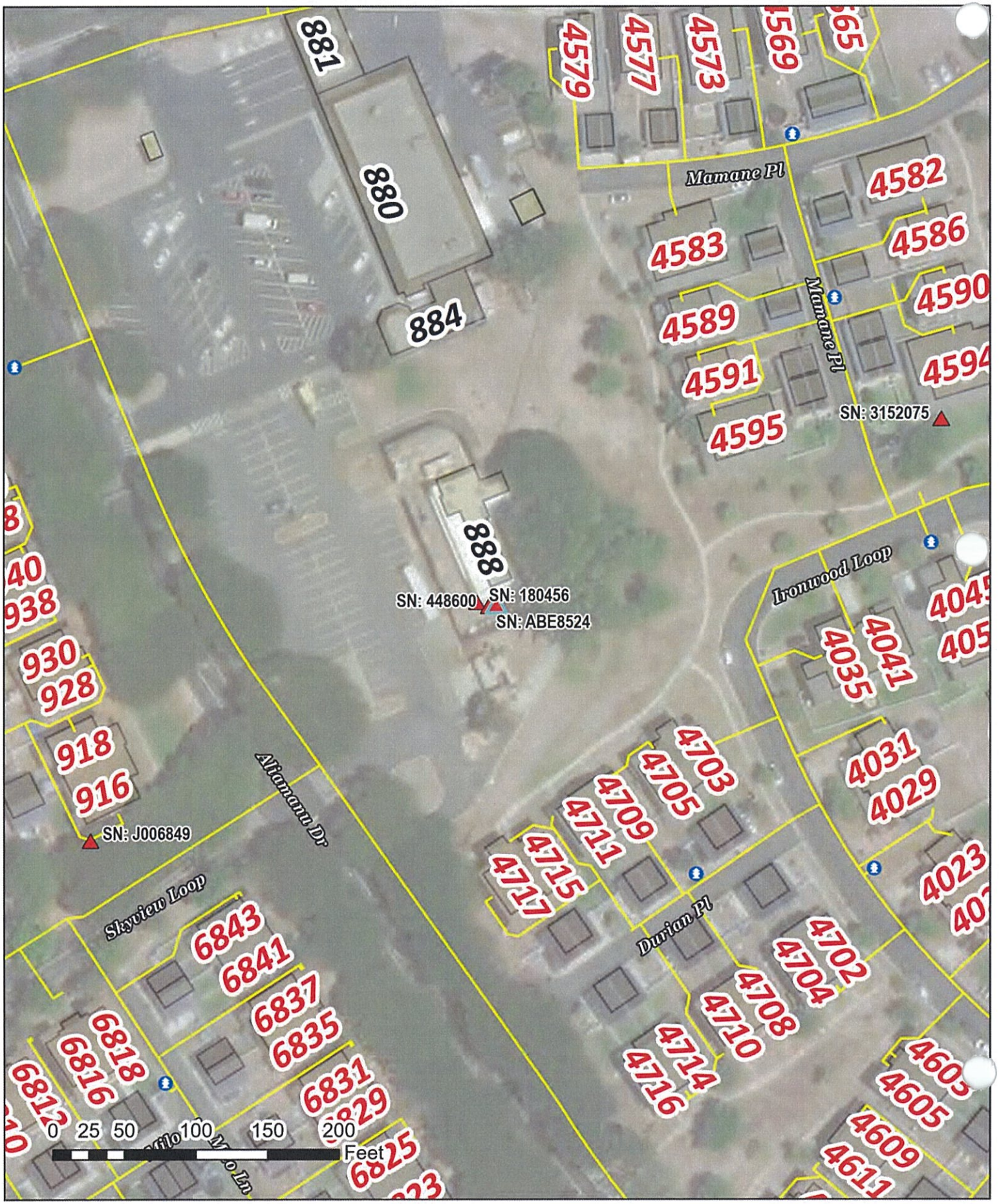
Back Flow Preventer: AMR Bldg 1783
BFPD SN: 10313U Watts 7 0.5" DCDA (Fire)



Back Flow Preventer: AMR Bldg 1790 (Irrigation)
BFPD SN: H15560 Febco 825Y 1.5" RP

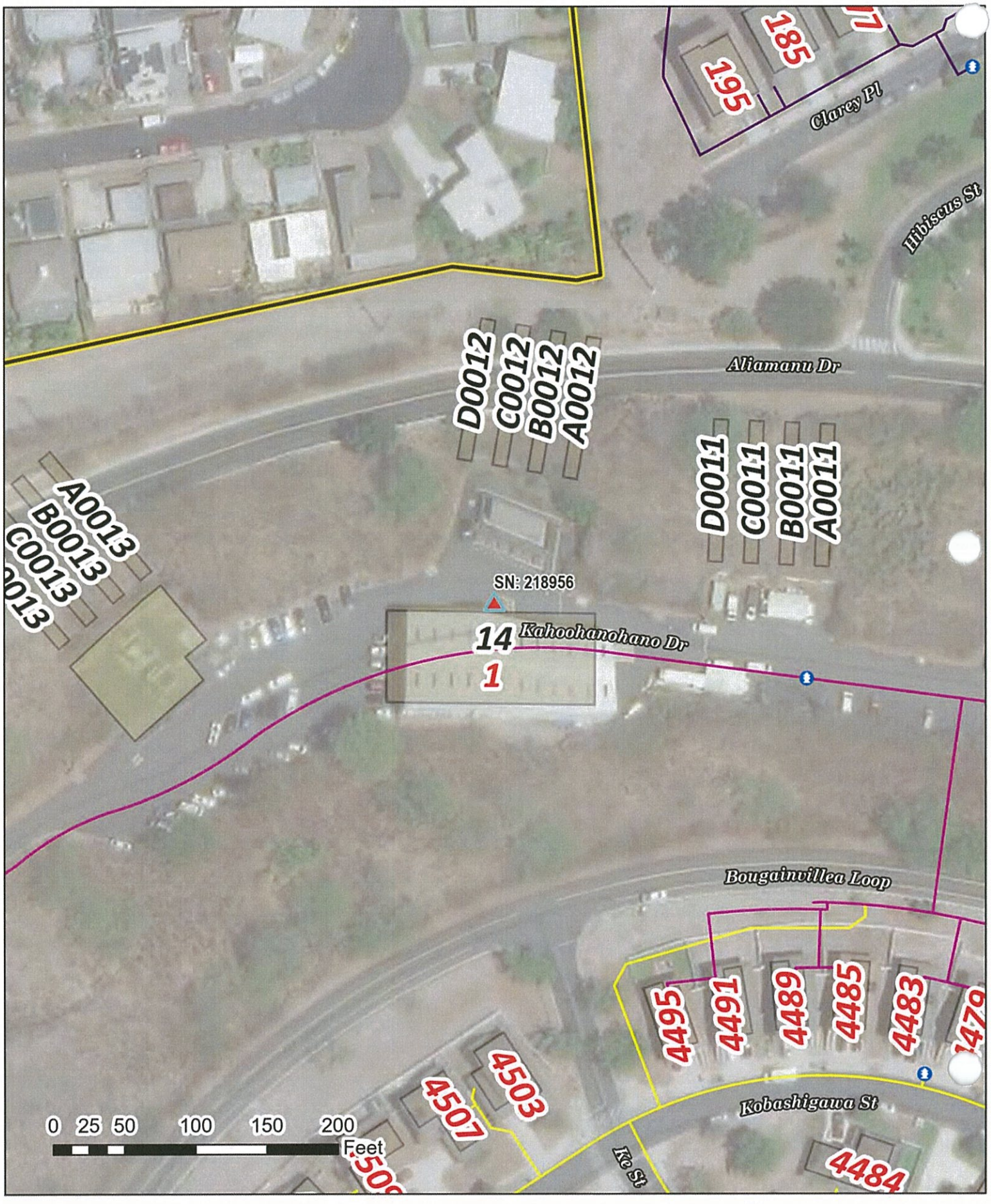


Back Flow Preventer: AMR Bldg 888
BFPD SN: ABE8524 Watts 975XL2 1" RP



Back Flow Preventer: Blackhaw Lp
BFPD SN: H16968 Febco 860 2" RP (Irrigation)

Back Flow Preventer: Bldg 14
BFPD SN: 218956 Watts 909 4" RP



Back Flow Preventer: Bldg 142 AMR1 Gate
BFPD SN: 3984492 Wilkins 975XL2 2" RP

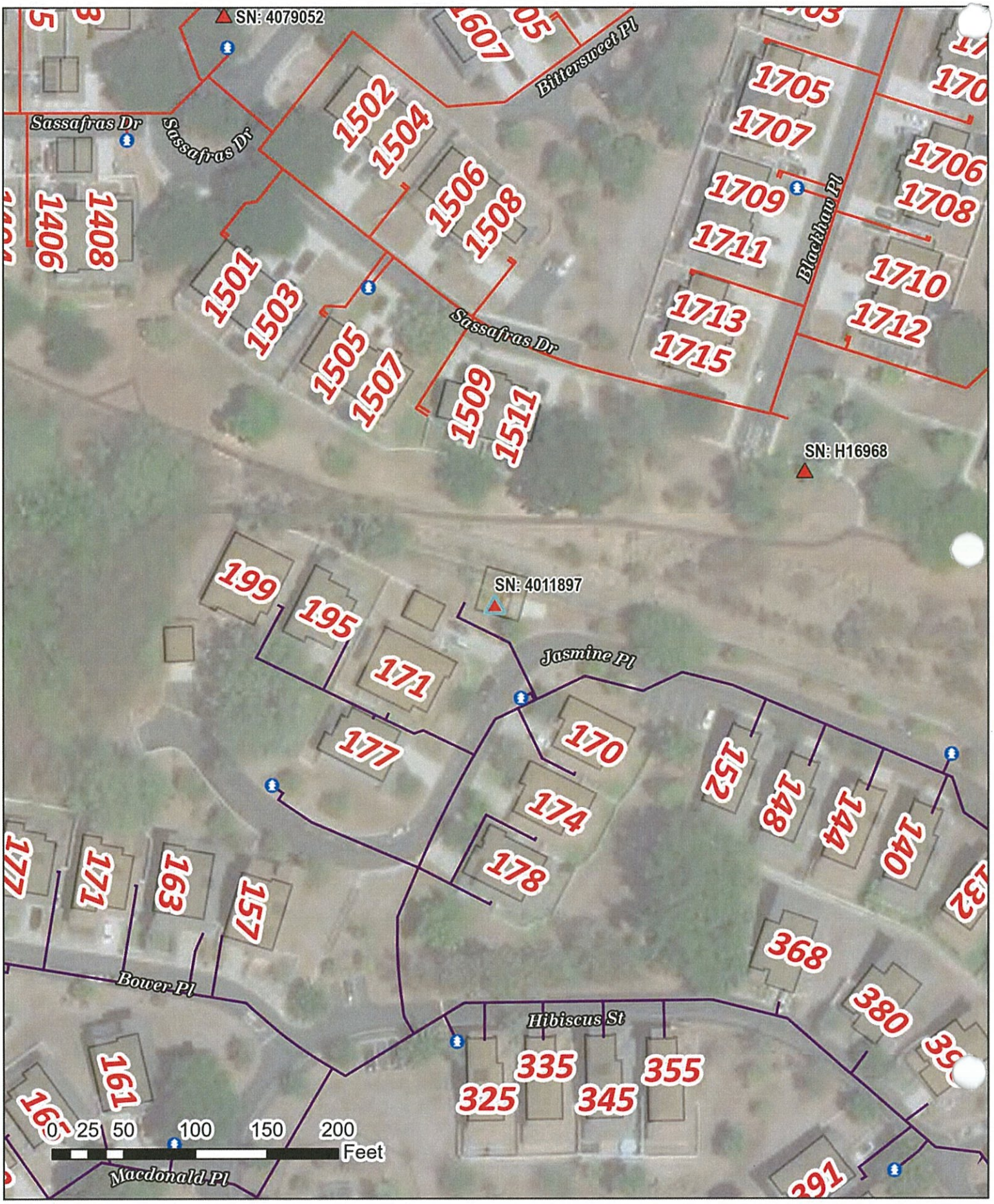
Back Flow Preventer: Bldg 142 AMR1 Storage
BFPD SN: 682681 Apollo 1.25" DC

Back Flow Preventer: Bldg 142 AMR1 WW
BFPD SN: 3940345 Wilkins 975XL2 2" RP

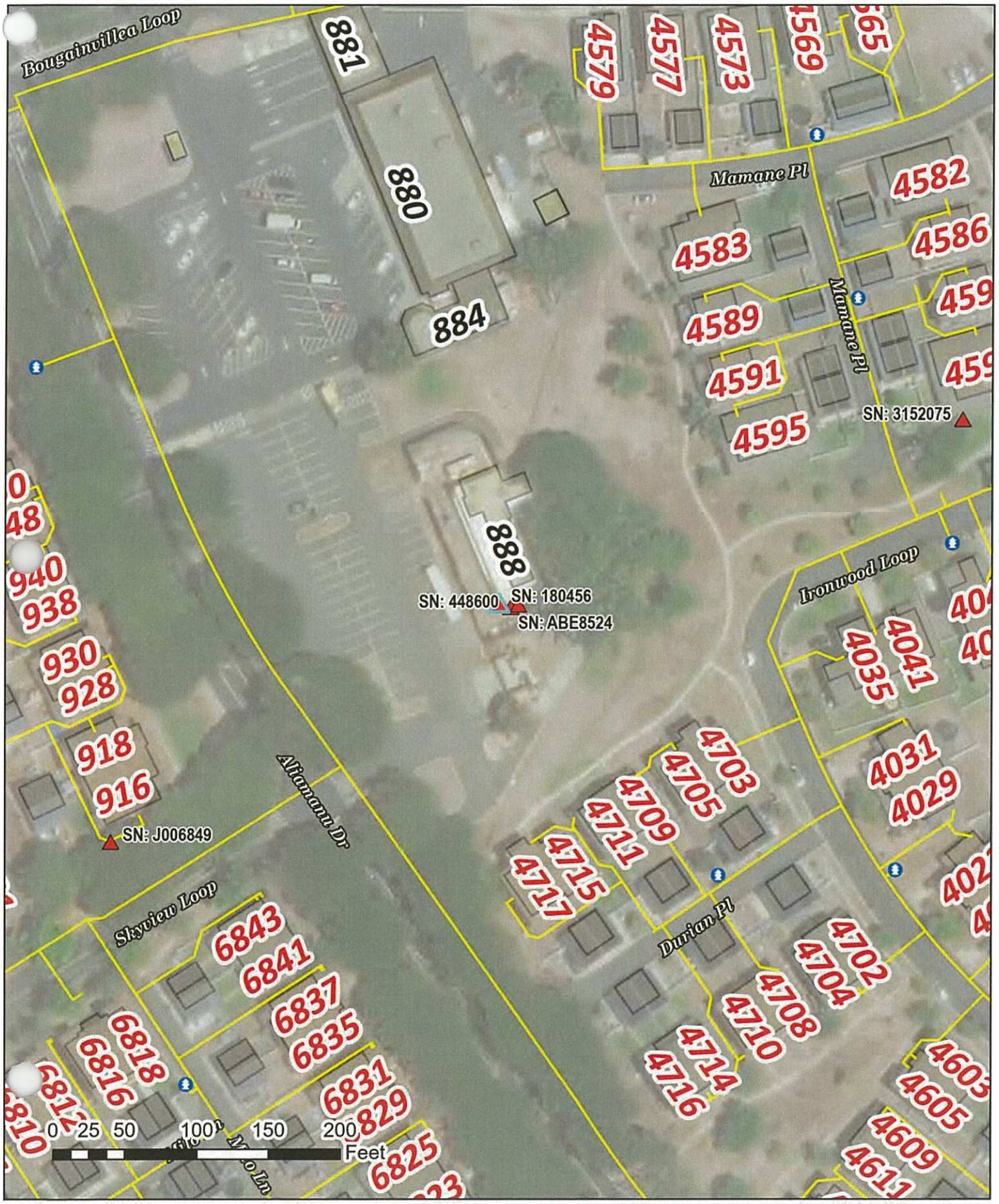
Back Flow Preventer: Bldg 2001 Coast Guard 1 Office
BFPD SN: 4481229 Wilkins 950XL 0.75" DC

Back Flow Preventer: Bldg 2001 Coast Guard 1 SPS
BFPD SN: 4090404 Wilkins 975XL 1.25" RP

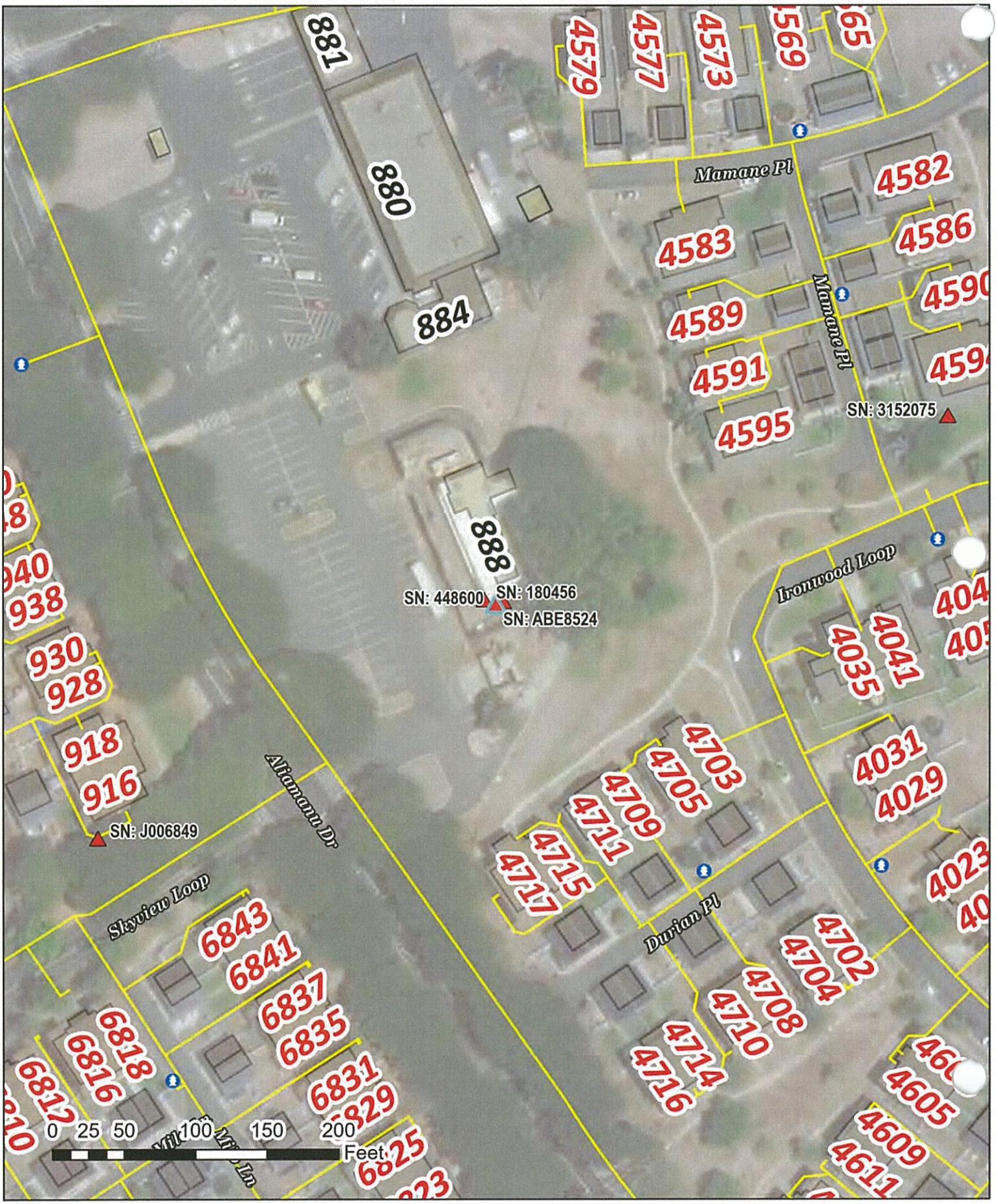
Back Flow Preventer: Bldg 248 AMR2
BFPD SN: 4011897 Wilkins 975XL 0.75" RP



Back Flow Preventer: Bldg 888
BFPD SN: 180456 Watts 709 4" DC



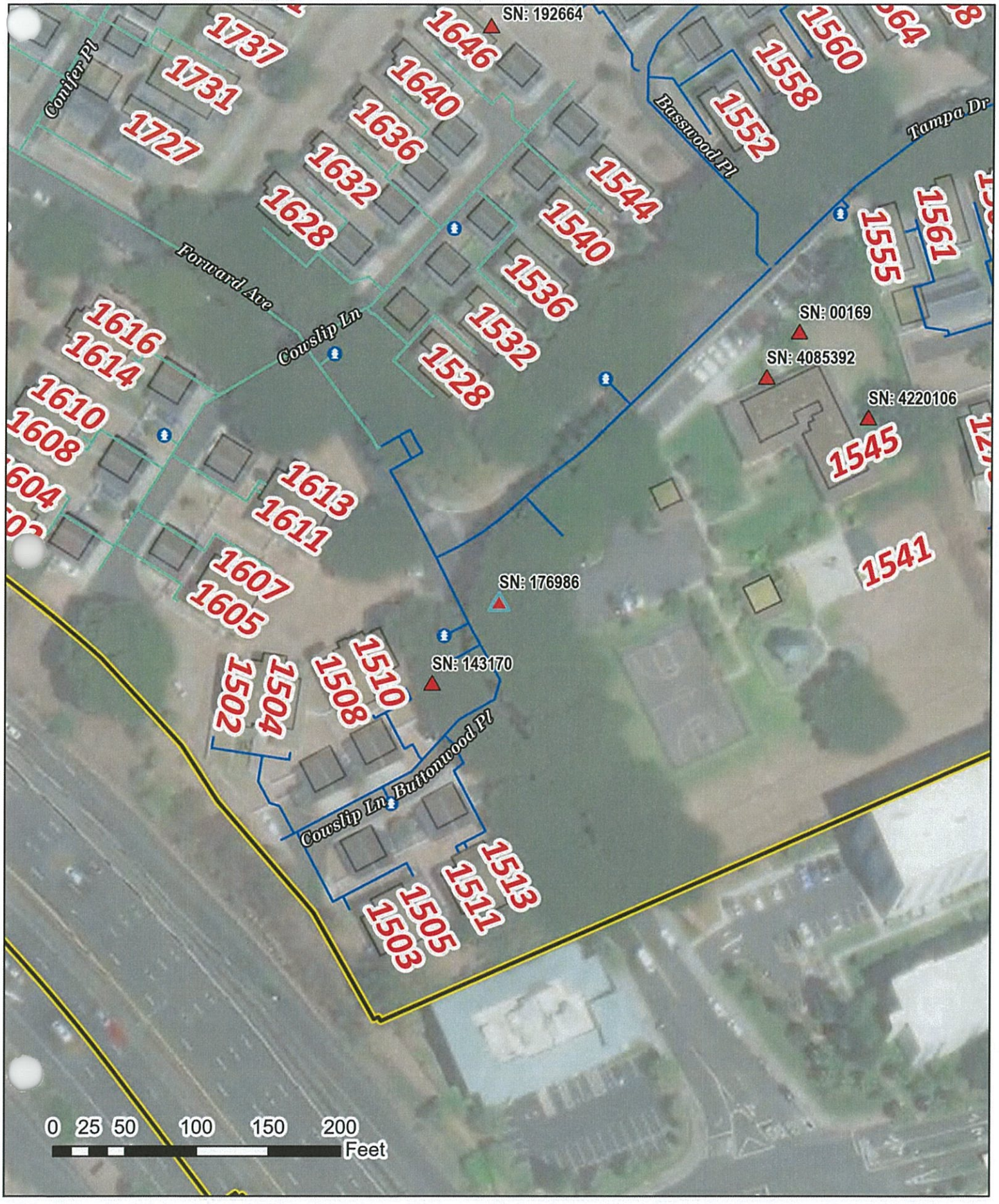
Back Flow Preventer: Bldg 888
BFPD SN: 448600 Watts 909M1 1.5" RP



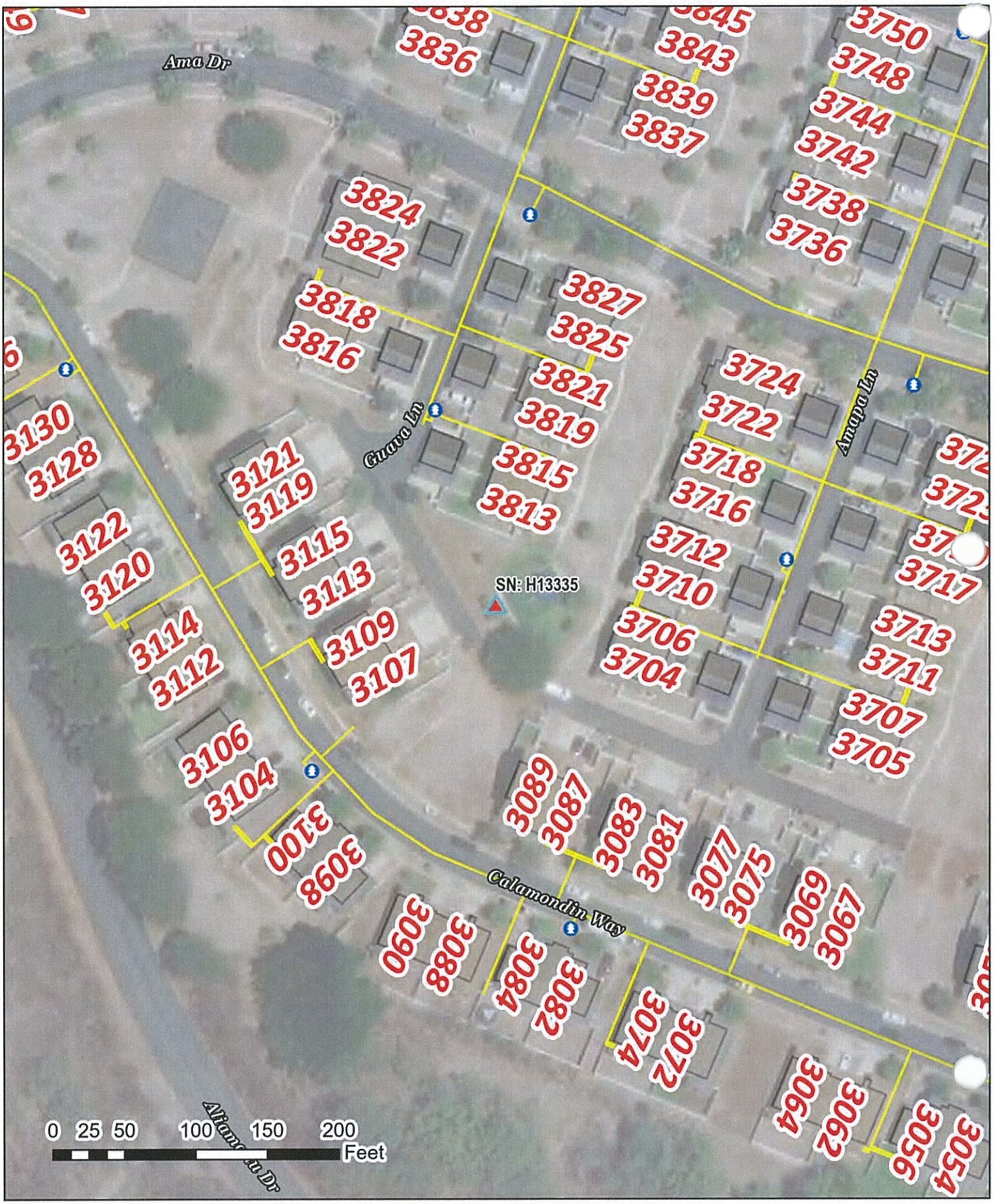
Back Flow Preventer: Bldg 900 Coast Guard 2
BFPD SN: 4079052 Wilkins 975XL 1.25" RP

Back Flow Preventer: Bldg 900 Coast Guard 2 Pump Room
BFPD SN: 542504 Wilkins 975XL 1.25" RP

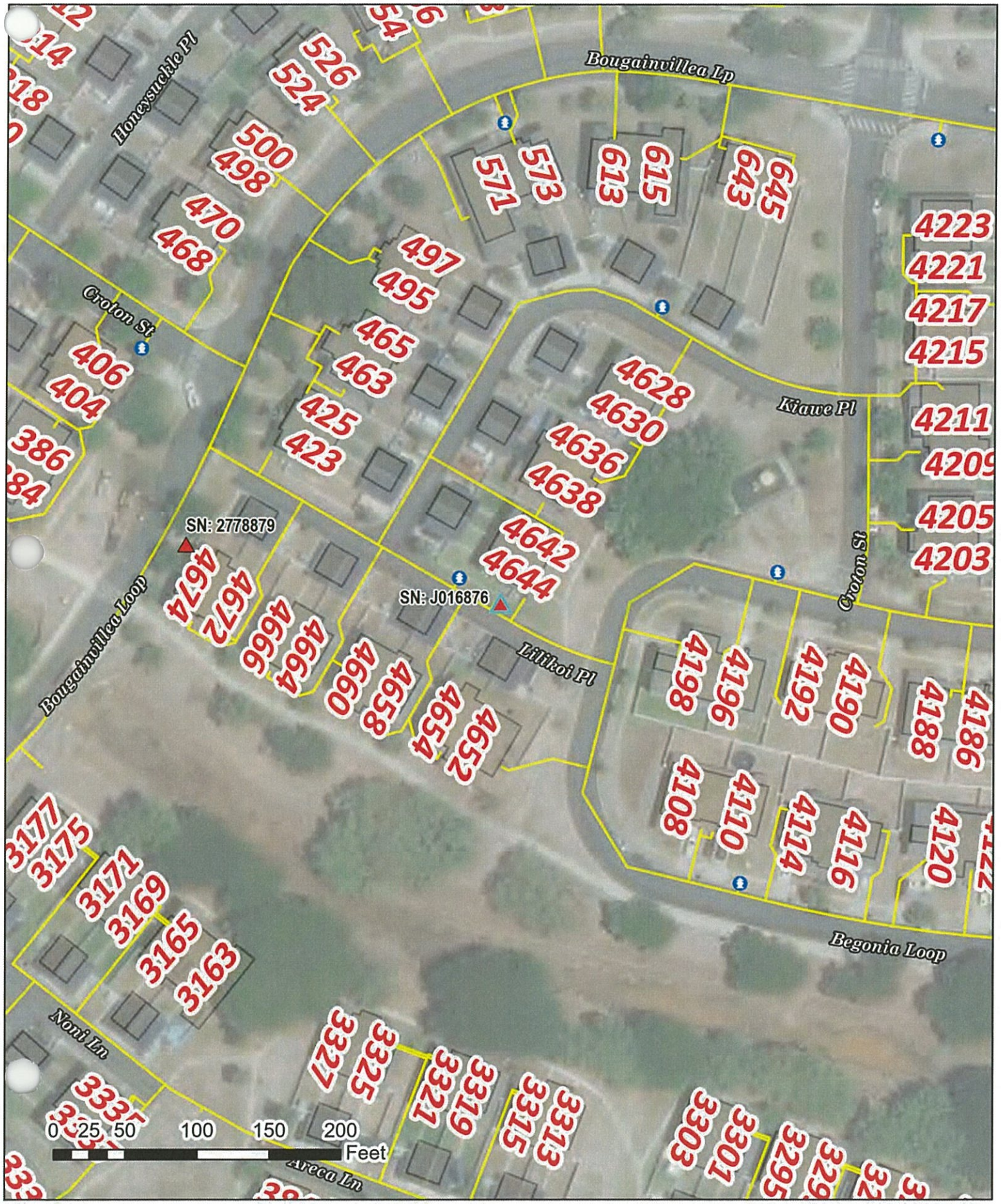
Back Flow Preventer: Forward Ave and Tampa Dr
BFPD SN: 176986 Apollo RP40 2" RP (Irrigation)



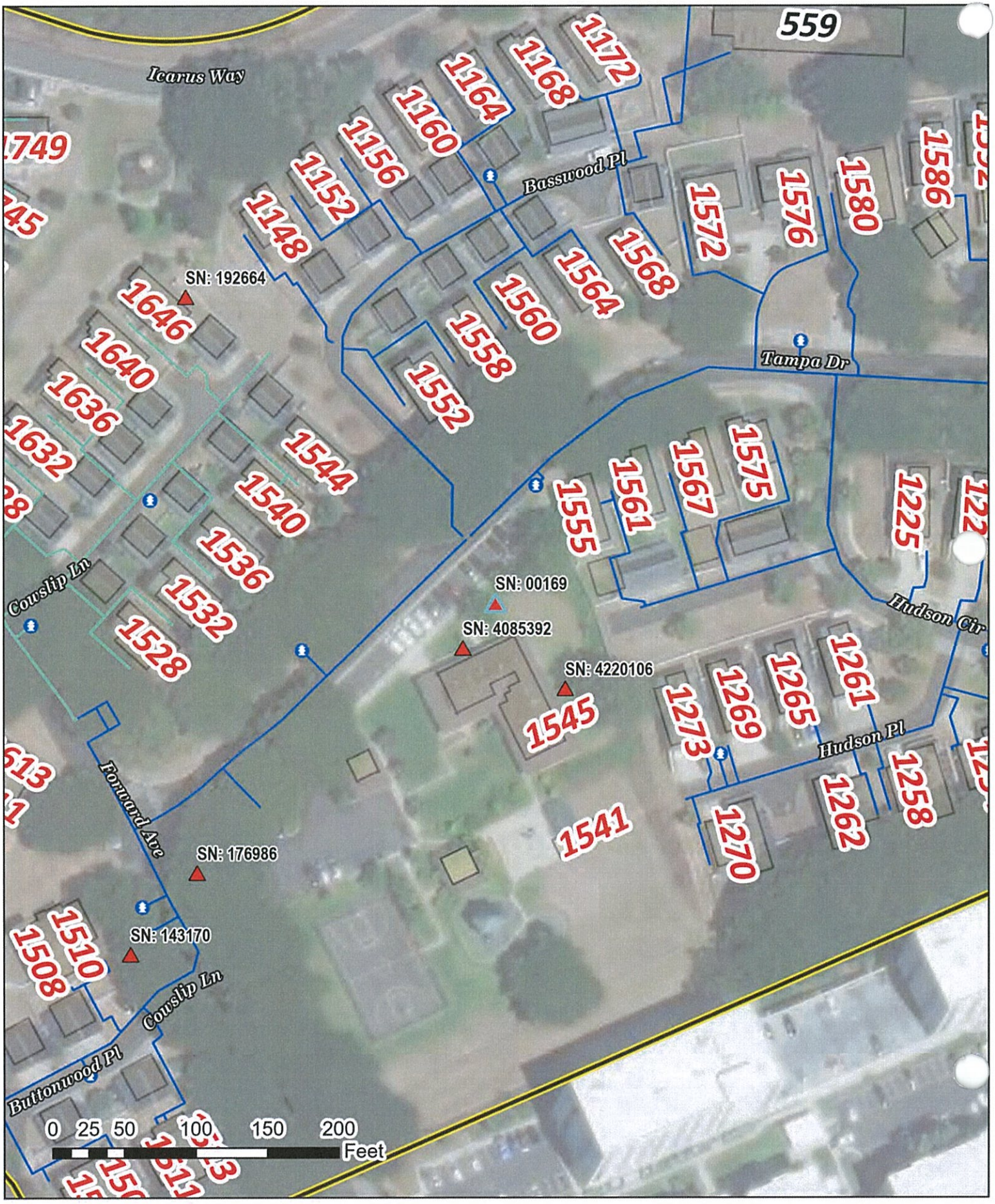
Back Flow Preventer: Guava Ln. Playground
BFPD SN: H13335 Febco 860 2" RP (Irrigation)



Back Flow Preventer: Lilikoi Ln. and Bergonia Lp
BFPD SN: J016876 Febco 825Y 2" RP (Irrigation)

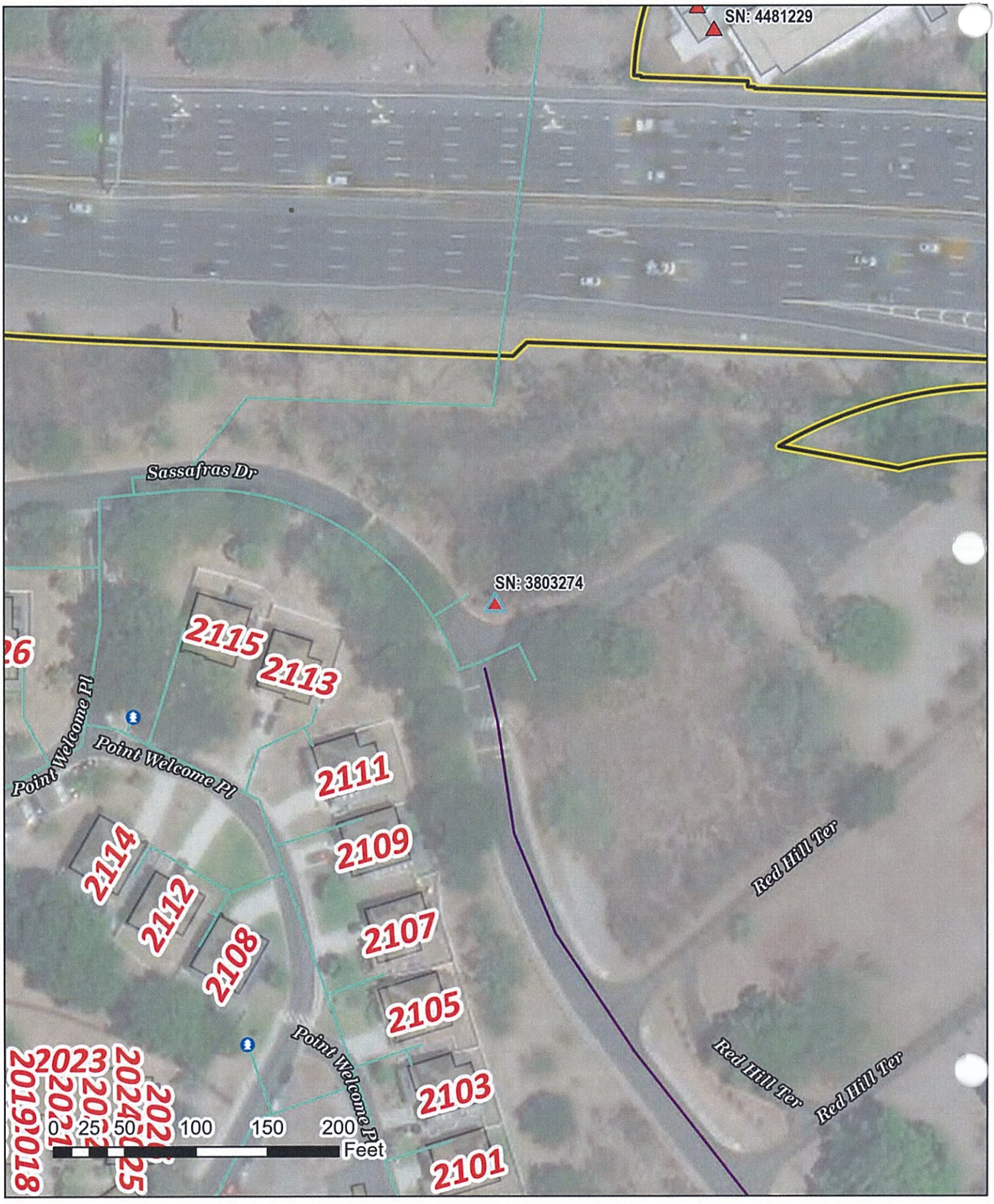


Back Flow Preventer: Red Hill Community Center Left Side
BFPD SN: 00169 Watts 909 3" RP



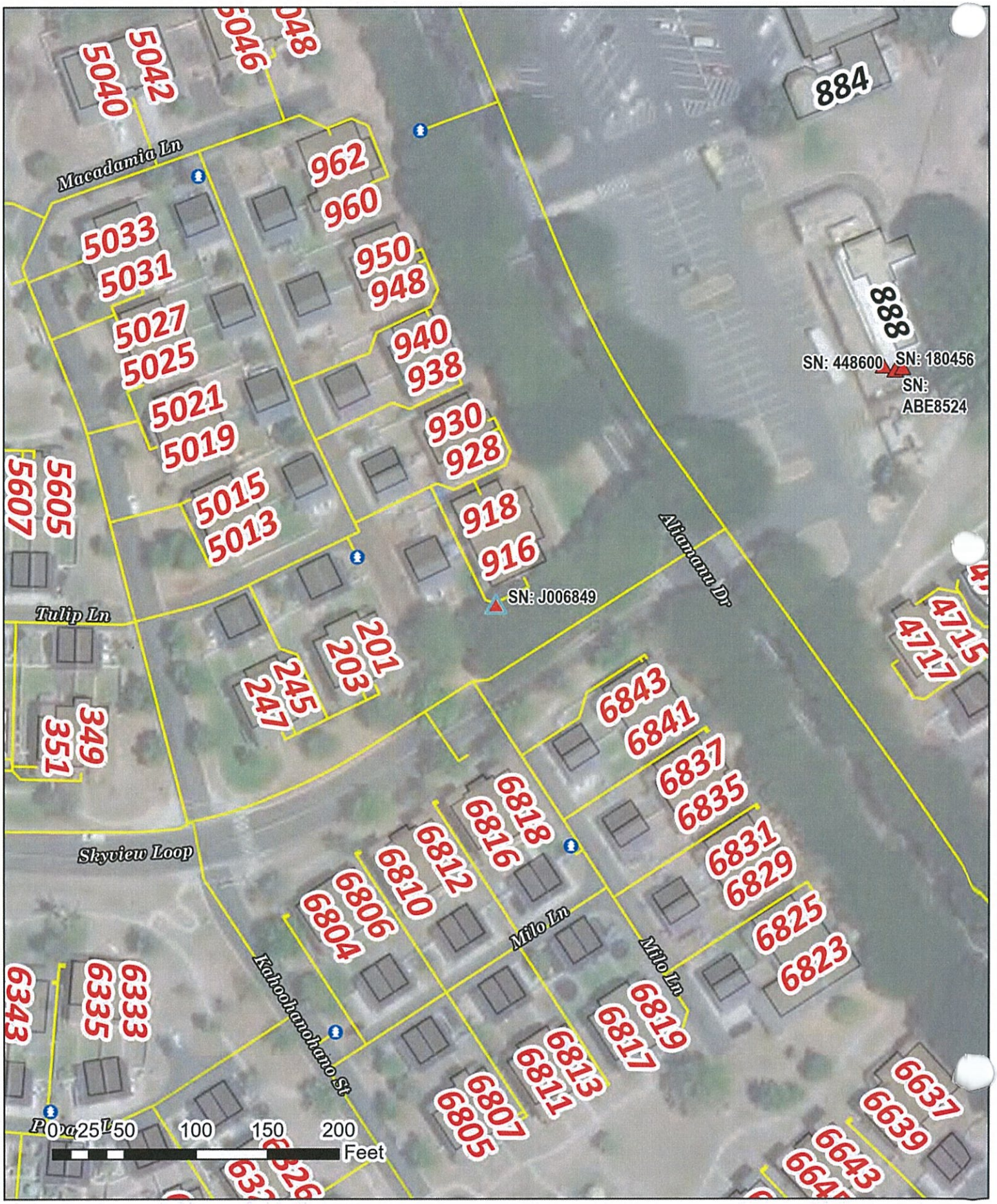
Back Flow Preventer: Red Hill Community Center Left Side Back
BFPD SN: 4220106 Wilkins 975XL2 1" RP

Back Flow Preventer: Red Hill Marque on Sassafras St
BFPD SN: 3803274 Wilkins R975XL 1.5" RP (Irrigation)



Back Flow Preventer: Skyview Lp & Kahoohanohano St
BFPD SN: 238623 Apollo PR40 2" RP (Irrigation)

Back Flow Preventer: Skyview St. Side of 916 Tulip Ln
BFPD SN: J006849 Febco 825Y 2" RP (Irrigation)



1C.2

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND, PACIFIC REGION
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
745 WRIGHT AVENUE, WHEELER ARMY AIRFIELD
SCHOFIELD BARRACKS, HAWAII 96857-5000

REPLY TO ATTENTION OF:

IMHW-PW

MAY 21 2015

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Program for Cross-Connection and Backflow Control

1. References.

a. United States Environmental Protection Agency, Cross Connection Control Manual, EPA 816-R-03-002, February 2003.

b. State of Hawaii, Hawaii Administrative Rules, Title 11, Department of Health, Chapter 21, Cross-Connection and Backflow Control, 16 December 2005.

c. AR 40-5, Preventive Medicine, 25 May 2007.

d. AR 420-1 Army Facilities Management, 12 February 2008.

e. DA PAM 40-11, Preventive Medicine, 22 July 2005.

f. TM 5-813-5, Water Supply, Water Distribution, November 1986.

g. TB MED 576, Sanitary Control and Surveillance of Water Supplies at Fixed Installations, 15 March 1982.

h. Air Force Instruction 32-1066, Backflow Prevention Program, 17 October 2007.

i. Unified Facilities Criteria (UFC) 3-230-02 Operation and Maintenance: Water Supply Systems, 10 July 2001.

j. American Water Works Association (AWWA) Recommended Practices for Backflow Prevention and Cross-Connection Control, M14, Third Edition, 2004.

k. Uniform Plumbing Code (UPC), 2006 Edition.

l. University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCFCCHR) Cross-Connection Control Manual, Tenth Edition, October 2009.

m. Water System Standards with Amendments, State of Hawaii, 2002.

2. Acronyms, Abbreviation and Special Terms. See Enclosure 2

3. Program Objectives.

a. All utility systems have inherent dangers. Of all the utility systems in Hawaii, the potable water system has the greatest potential for widespread disruption and casualties from a single incident. Despite decades of effort, cross-connection and backflow incidents continue to occur in this country. The goal of this program is to establish the necessary framework for a safe and secure potable water system.

b. To accomplish this, the Directorate of Public Works (DPW) will establish and maintain a continuing program of cross-connection and backflow control, in accordance with AR 420-1, 23-23 j. This will allow for the elimination, removal, control, testing and monitoring of all existing cross-connections between the potable and non-potable water systems, plumbing fixtures, industrial piping and recycled water systems in our facilities.

c. The DPW will work closely with the United States Army Corps of Engineers (USACE) and any entity working or causing any work involving the potable water system to prevent the installation of new cross-connections on the potable water system. Where this is not possible, USACE or the entity will identify the location and type of cross-connection and install hazard appropriate controls. All data, including applicable test results, regarding new cross-connections will be reported promptly to the DPW.

d. The consumer is both the first line of defense and a significant threat to the potable water system. With this in mind, the DPW will assist Preventive Medicine Service (PVNTMED) in educating our consumers on the hazards of cross-connection and backflow. The DPW will implement a system of containment, the isolation of individual facilities from the potable water system. The consumer is responsible for the internal protection of their facilities.

e. Recycled water is officially classified as unsafe for human consumption, in order to safeguard the potable water supply, no direct or indirect cross-connections are allowed at any time between the potable water system and any recycled water system. An air gap separation is the only device approved for use to supply water from a potable water system to a recycled water system.

f. In order to defend the potable water system, breaches of this document will result in the immediate termination of water service without prior notification and may subject the offending party to civil and criminal penalties. Additionally, the Director may, at the consumer's expense, order the necessary tests, repairs or work required to bring a system back into compliance with this document.

4. Scope/Applicability. The provisions of this program apply to any civilian, military, government or contractor personnel, sections, directorates, operations and activities on all United States Army installations utilizing water provided by the Directorate of Public Works (DPW) in the State of Hawaii.

5. Inventories.

a. The DPW, through the use of surveys, DD 1354s and historical data, develop and maintain an inventory of all cross-connections with the potable water system. These inventories will be used to develop inspection and testing schedules.

b. Cross-Connection and Backflow Control Survey

(1) Every five (5) years with the, assistance of PVNTMED, approved DPW personnel and/or contractors shall survey all existing facilities and water systems within the United States Army Installation Management Command, Pacific Region. Alternately, an annual survey of twenty (20) per cent of all existing facilities and water systems may be performed. An annual survey program must ensure that no facility or system goes longer than five (5) years without being surveyed. Surveys will include detailed locations of backflow prevention devices and cross-connection hazards, an identification of backflow prevention devices (size, type of device, manufacturer, model, serial number and type of system it services), identification of cross-connections, description of water usage, classification of hazard and type of approved device recommended (Table 2 of Enclosure 3). Surveys may include photographs, longitudinal and latitudinal coordinates, sketches and any information deemed useful by the surveyor. Additional information may be requested by PVNTMED or the DPW.

(2) All consumers will cooperate fully with the personnel conducting these surveys.

(3) A survey will be conducted on all new facilities and systems upon completion and prior to acceptance.

(4) Surveyors must be approved by the Director and must have satisfactorily completed a training program such as:

a. A survey course addressing federal and state regulations, cross-connection identification, types and uses of backflow prevention devices recognized by the State of Hawaii.

b. A survey course addressing federal and state regulations, cross-connection identification, types and uses of backflow prevention devices sponsored by a nationally

or internationally recognized professional organization with written and performance examinations.

c. Graduation from an appropriate Bachelor-level engineering program approve by the Accreditation Board for Engineering and Technology, along with backflow training.

(5) Surveys will be conducted during normal duty hours and reasonable efforts will be taken to minimize disruptions to consumer operations.

(6) Copies of surveys will be provided to the DPW. The DPW has the responsibility to maintain all survey data. Using this data the DPW will initiate actions to eliminate the hazards identified. The data will also be used by the DPW to formulate inspection and testing schedules for all testable BFPAs. All testable BFPAs will be assigned and labeled with a control number.

(7) Residences in family housing areas are excluded from surveys. Underground irrigation systems, offices, maintenance facilities (non-residential facilities) in housing areas are not excluded.

c. New Construction and Renovation Projects.

(1) New construction and renovation projects will report all new cross-connections to the DPW. This will include the location, description of water usage, classification of hazard and type of approved device used (Table 2 of Enclosure 3). Identify the location, manufacturer, model, serial number and test results of any BFPAs used to control a cross-connection.

(2) Failure to comply with survey requirements will result in termination of water service to the consumer. Failure to comply with survey requirements may result in rescission of the permit to supply public potable water.

6. Inspection and Performance Testing of Backflow Prevention Devices

a. As both the administrative authority and the water purveyor the DPW will develop and maintain schedules that ensure all backflow prevention devices are inspected and tested annually. The DPW will track and schedule the point of service connection for facilities that are not maintained by the DPW (containment). Annual inspection and testing of internal backflow prevention devices for these facilities are the responsibility of the consumer. More frequent testing may be required by the Director in those instances where the hazard is deemed great.

b. All consumers are responsible for the annual inspection and testing backflow prevention devices on or within their facilities. All consumers will cooperate fully with the personnel conducting inspections and performance testing of backflow prevention devices.

c. Annual Inspection. A certified tester shall inspect identified cross-connection locations to ensure that:

(1) Proper air gaps are maintained.

(2) Backflow prevention devices are fully functional, in good condition and readily accessible.

(3) All devices are properly installed, meet the installation criteria of this document and are free of debris that could interfere with their testing or operation.

(4) All backflow prevention assemblies on all installations shall be inspected and tested at least annually. More frequent testing may be required by the Director in those instances where the hazard is deemed great. Testing will be in accordance with the current edition of the USCFCCCHR.

d. Backflow prevention assemblies (BFPAs) on all installations shall also be inspected and tested:

(1) Prior to the initiation of water service.

(2) Immediately after replacement or repair.

(3) Testers must be approved by the director and must have a current backflow prevention assembly tester's certification recognized by the State of Hawaii for the assembly being tested.

(4) All gauges used to test BFPAs will be tested and certified for accuracy at least annually.

(5) Inspection and test results will be reported to and maintained by the DPW as the water purveyor and be made available to applicable external agencies where required.

(6) The DPW will maintain records of inventories, inspection, testing, maintenance and repair for all BFPAs under its jurisdiction. These records will be provided to applicable external agencies where required.

(7) The DPW will maintain records of inventories, inspection, testing, maintenance and repair for all service connection BFPAs where the DPW is acting only as the water purveyor. These records will be provided to applicable external agencies where required.

(8) BFPAs under the jurisdiction of the DPW Operations and Maintenance (O & M) Division will be inspected and tested according to the latest approved testing schedule and test form. Necessary repair, identified during testing, will be performed as soon as practicable. The assembly will be re-tested immediately after repair is completed.

(9) As the water purveyor the DPW will act as the administrative authority for consumer BFPAs not under the jurisdiction of the DPW O & M Division. These consumers are responsible for inspecting all backflow prevention devices and the annual testing of all BFPAs in their facilities. More frequent testing may be required by the Director in those instances where the hazard is deemed great. The DPW will notify consumers sixty (60) days before the due date of each service connection BFPA in their facility. The test form is attached as enclosure 4 and will be made available online. Testing of these BFPAs will be done at the consumer's expense. Necessary repair, identified during testing, will be performed as soon as practicable. The assembly will be re-tested immediately after repair is completed. A listing of contractors with certified BFPA testers may be obtained from the Honolulu Board of Water Supply. The use of this listing is not an endorsement by the United States Government, the Department of Defense, the Department of the Army, the United States Army Garrison-Hawaii or the Directorate of Public Works.

e. Failure to comply with inspection and testing requirements will result in termination of water service to the consumer. Alternatively, the director may, at the consumer's expense, order the performance of the necessary test, needed repairs and replacements.

7. Installation of Backflow Prevention Devices.

a. Engineering solutions to eliminate cross-connections must be the first consideration in the design of water systems. If this is not feasible, the installation of an approved backflow prevention device appropriate to the hazard class (Table 2 of Enclosure 3) must be installed. Double Check Valve (DC), Double Check Detector (DCDA) and Double Check Detector-Type II (DCDA-II) Assemblies are allowed for use by the DPW only on fire sprinkler systems. *Air gap separations are the only approved device to supply potable water to a recycled water or sewer system.*

b. The safety and security of devices must be considered. Devices need to be located or protected from adverse conditions (electrical panels, traffic, temperature

extremes, etc.). Enclosures or supervisory controls should be used to protect devices serving facilities deemed critical to force protection. These controls should be designed to prevent the accidental or malicious tampering of devices. Experience has shown that locking ball valves and the use of padlocks and chain are more reliable and cost-effective than

c. New backflow prevention devices will be designed and installed in accordance with the manufacturer's specifications. Backflow prevention assemblies will be listed in the current edition of approved devices published by the USCFCCCHR and installed only in approved orientations.

d. Adequate drainage will be provided to prevent the submersion of the device. If the discharge of water during the operation of the relief valve in a RP may cause damage to its surroundings an air gap drain will be installed. The air gap drain must be properly sized and approved by the manufacturer of the RP. Drain piping must be correctly sized, installed, secured and directed to a location appropriate to the amount of water flow anticipated.

e. The primary potable water service connection to a facility will be provided with properly sized, approved BFPAs installed in parallel (manifold assembly) to allow for testing, maintenance and repair without the need for a loss of water service. Existing single BFPAs may be retrofitted with bypass assemblies with hazard appropriate BFPAs only in those instances where the bypass will maintain sufficient flow to meet the consumer's needs.

f. New backflow prevention assemblies will be designed and installed to be readily accessible and conform to the specifications in Table 1 of Enclosure 3.

g. Installations elevated more than five (5) feet (1524 mm) above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance personnel.

h. A backflow prevention device shall not be installed in a concealed ceiling space, underground or in a vault.

i. All backflow prevention assemblies must be tested prior to initiation of water service.

j. Backflow Prevention Assemblies will be painted as follows. Care must be exercised avoid painting over operational orifices such as vacuum reliefs, air inlets or threaded inlets.

(1) Recycled Water BFPAs will be painted purple, Pantone 522.

(2) Fire Sprinkler BFPAs will be painted "Safety Red", PPG V70-5.

(3) All other BFPAs will be painted "Cordovan Brown", PPG V70-640.

(4) Temporary water service connections are not required to be painted.

8. Hose Bibs. Non-removable hose bibb vacuum breakers shall be installed on all hose bibbs supplied with potable water. Hose bibb vacuum breakers will meet ASSE Standard 1011-2004, Performance Requirements for Hose Connection Vacuum Breakers.

9. Water-Based Fire Suppression Systems.

a. For cross-connection control purposes, fire suppression systems will be classified on the basis of water source and the arrangement of supplies as follows.

(1) Class 1. Direct connections from potable water mains only; no pumps, tanks or reservoirs; no physical connection from other water supplies; no antifreeze or other additives of any kind; sprinkler drains discharging to atmosphere, dry wells or other safe outlets.

(2) Class 2. Identical to Class 1, except booster pumps may be installed in the connections from the potable water mains. Booster pumps do not affect the potability of the system however, it is necessary to avoid drafting so much water that the pressure in the water main is reduced below fifteen (15) psi residual.

(3) Class 3. Direct connections from potable water mains plus one or more of the following; elevated storage tanks, fire pumps taking suction from above-ground covered reservoirs or tanks, and pressure tanks. All storage facilities are filled by or connected only to potable water systems, the water in the tanks must be maintained in a potable condition.

(4) Class 4. Directly supplied from potable water mains where antifreeze or other additives such as Aqueous Firefighting Foam (AFFF) are used.

(5) The use of auxiliary or industrial water interconnected with the potable water system is no longer acceptable.

b. All new fire suppression systems that use potable water will have a backflow prevention assembly installed. The type of assembly selected will be in accordance with Table 3 of Enclosure 3.

c. All existing class 1 and class 2 fire suppression systems are exempted from the installation of a new backflow prevention assembly. These systems will install the appropriate type of assembly, as specified in Table 3 of Enclosure 3, at the next major system renovation.

d. All existing class 3 and class 4 fire suppression systems will be retrofitted or upgraded as soon as practicable to the appropriate type of assembly as specified in Table 3 of Enclosure 3.

e. When backflow prevention assemblies are to be retroactively installed or upgraded on existing systems, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary system modifications for the additional friction loss, shall be completed as part of the installation. A registered Professional Engineer (PE), preferably a Fire Protection Engineer (FPE), must approve the design and all submittals for any additions or changes to the existing fire suppression system.

10. Irrigation Systems.

a. Atmospheric vacuum breakers (AVB) shall be installed after the last control valve of each sprinkler circuit and at a minimum of six (6) inches above the highest irrigation head. The AVB shall be installed only on irrigation circuits that will not return any pressure in the circuit when the circuit control valve is closed (No valves downstream of the AVB). An AVB is designed for intermittent use and will not be operated more than 12 hours in any 24 hour period.

b. Pressure vacuum breakers (PVB) shall be installed at the beginning of each irrigation circuit and at a minimum of twelve (12) inches above the highest irrigation head on the circuit. Individual irrigation circuits having quick coupling valves or other similar type heads that will permit pressure to be retained in the circuit shall have a PVB installed as a minimum requirement for each circuit. Irrigation systems using subsurface drip method shall have a PVB in each circuit. A PVB may not be installed where a reduced pressure principle backflow prevention assembly (RP), or air gap separation is required.

c. A reduced pressure principle backflow prevention assembly (RP) may be installed to serve multiple irrigation circuits in lieu of vacuum breakers on each individual circuit.

d. Double check valve assemblies (DC) of any type are no longer allowed to be used in irrigation systems.

11. Temporary Water Services.

a. All applications for temporary water service connections will follow the provisions of the United States Army Garrison, Hawaii (USAG-HI Regulation Number 420-2, Standard for Temporary Water Service (enclosure 5).

(1) A temporary water meter shall be installed by the Directorate of Public Works, Utilities Division.

(2) A reduced pressure principle backflow prevention assembly (RP) shall be provided, installed and tested by the requestor.

(3) Testing will be conducted by a certified backflow prevention assembly tester acceptable to the Director and qualified to test a reduced pressure principle backflow prevention assembly (RP). Testing will be completed immediately after installation and prior to initiation of temporary service. Any repairs identified during testing must be completed prior to initiation of temporary service. Test results shall be provided to the Directorate of Public Works, Utilities Division no later than the following business day.

12. Recycled Water Systems. The use of recycled water poses a real and significant threat to our potable water supply. Serious incidents throughout the country illustrate the need to strictly adhere to the guidelines outlined in this section and throughout this document.

a. Recycled water piping will be colored in purple, Pantone 522, and will be clearly and continuously marked "CAUTION: RECYCLED WATER-DO NOT DRINK".

b. At no time will pipe marked and colored for recycled water use be used for any reason, on any portion of a potable water system.

c. At no time will unmarked or non-purple colored pipe be used for any reason, on any portion of a recycled water system.

d. All valve box covers on recycled water systems in order to prevent interchange with potable valve covers:

(1) Will be colored purple, Pantone 522.

(2) Will be triangular in shape, such as D & L Foundry M9009 or M9019.

(3) Cast with the inscription "RECYCLED WATER".

e. At no time will any cross-connection be allowed between a potable water supply and any recycled water system.

f. An air gap separation is the only backflow prevention device that will be allowed to supply potable water to a recycled water system.

g. Hazard appropriate (Table 2 of Enclosure 3) backflow prevention devices are allowed for use from a recycled water system to a recycled water system of the same classification.

(1) All backflow prevention devices on a recycled water system will meet the installation requirements in section 5 of this document.

(2) All backflow prevention devices on a recycled water system will be colored purple, Pantone 522, and be clearly marked "CAUTION: RECYCLED WATER-DO NOT DRINK"

(3) All backflow prevention devices on a recycled water system are subject to the inspection and testing requirements in section 4 of this document.

(4) All testers of BFPAs on recycled water systems must meet the standards outlined in section 4 of this document.

(5) Test equipment used to test BFPAs on recycled water systems will never be used to test BFPAs on potable water systems.

13. Point of contact for the content of this document is Mr. Monte Martin, Chief, Operation and Maintenance Division, DPW, USAG-HI, telephone number, (808) 655-0591, or e-mail: monte.l.martin.civ@mail.mil.

Encl
as

STEVEN M. RAYMOND
Director of Public Works

1. Acronyms, Abbreviation and Special Terms

- **Administrative Authority.** The term "Administrative Authority" shall mean the United States Army Garrison, Hawaii, Directorate of Public Works vested with the authority and responsibility to administer, enforce and maintain the provisions of this cross-connection control program.

- **Air Gap.** The term "air gap" shall mean the physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An "approved air gap" shall be at least double the diameter of the supply pipe measured vertically above the overflow rim of the vessel and in no case shall the gap be less than 1 inch (2.54 cm).

- **Approved.** The term "approved" shall mean accepted by the State of Hawaii, Department of Health and the United States Army Garrison, Hawaii, Directorate of Public Works as meeting the applicable specifications or as suitable for the proposed purpose.

- **Approved Device.** The term "approved device" shall mean a backflow prevention assembly, device or method acceptable to the United States Army Garrison, Hawaii, Directorate of Public Works and approved by recognized independent agencies such as the American National Standards Institute (ANSI), American Society of Safety Engineers (ASSE), International Association of Plumbing and Mechanical Officials (IAPMO), Underwriters Laboratories, Inc. (UL), Uniform Plumbing Code (UPC), University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCFCCCHR).

- **Atmospheric Vacuum Breaker Backsiphonage Prevention Assembly (AVB).** The term "atmospheric vacuum breaker backsiphonage prevention assembly" shall mean an assembly containing an air inlet valve, a check seat and an air inlet port(s). The flow of water into the body causes the air inlet valve to close the air inlet port(s). When the flow of water stops, the air inlet valve falls and forms a check valve against backsiphonage. At the same time it opens the air inlet port(s) allowing air to enter and satisfy the vacuum. A shutoff valve immediately upstream may be an integral part of the assembly, but the assembly shall not be subjected to operating pressure for more than twelve (12) hours in any twenty-four (24) hour period. This assembly is designed to protect against pollutant and contaminant hazards under a backsiphonage condition only. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Backflow.** The term "backflow" shall mean the undesirable reversal of flow of water and other liquids, gases or other substances into the distribution pipes of a potable supply of water from any source or sources. See terms **Backpressure** and **Backsiphonage**.

- **Backflow Prevention Assembly - Approved (BPA, BFPA).** The term "approved backflow prevention assembly" shall mean an assembly that has been investigated and approved by the administrative authority. The backflow prevention assembly shall be manufactured in full conformance with the standards established by the AWWA –C506-78 and have completely met the laboratory and field performance specification of the USCFCCCHR. The director may accept standards and testing results from other acceptable laboratories when it becomes necessary. The current types of approved backflow prevention assemblies are:

  - Atmospheric Vacuum Breaker (AVB).
  - Double Check Valve Backflow Prevention Assembly (DC).
  - Double Check - Detector Backflow Prevention Assembly (DCDA).
  - Double Check - Detector Backflow Prevention Assembly-Type II (DCDA-II).
  - Pressure Vacuum Breaker (PVB).
  - Reduced Pressure Principle Backflow Prevention Assembly (RP, RPZ).
  - Reduced Pressure Principle - Detector Backflow Prevention Assembly (RPDA).
  - Reduced Pressure Principle - Detector Backflow Prevention Assembly-Type II (RPDA-II).
  - Spill - Resistant Pressure Vacuum Breaker Backsiphonage Prevention Assembly (SVB).

- **Backflow Prevention Device.** The term "backflow prevention device" shall mean a device, method or construction used to prevent backflow into a potable water system. These include but are not limited to Air Gaps, Barometric Loops, Check Valves (CV) and BFPAs.

- **Backpressure.** The term "backpressure" shall mean any elevation of pressure in the downstream piping system above the supply pressure which would cause a reversal of the normal direction of flow.

- **Backsiphonage.** The term "backsiphonage" shall mean a form of backflow due to a reduction in supply pressure which causes a sub-atmospheric pressure to exist at a site in the water system.

- **Certified Tester** The term "certified tester" shall mean any of two classes of testers.

- General Tester. An individual, who has been trained, qualified and certified by an approved organization to perform inspection, testing and repairs on all backflow prevention assemblies.

- Limited Tester. An individual, who has been trained, qualified and certified by an approved organization to perform inspection, testing and repairs on the specific devices contained within a specific facility.

- All testers must be approved by the Director and must have a current backflow prevention assembly tester's certification recognized by the State of Hawaii.

- **Check Valve.** The term "check valve" shall mean any self-closing device which is designed to permit flow in one direction only.

  - An approved check valve is a check valve that is drip tight in the normal direction of flow when the inlet pressure is at least one (1) psi (pound per square inch) and the outlet pressure is zero. It shall not permit leakage in a direction reverse to the normal flow. The closure element shall be internally loaded to promote rapid and positive closure.

- **Consumer.** The term "consumer" shall mean any individual, section, directorate, operation or activity using or receiving water from the DPW.

- **Containment.** See **Service Protection**.

- **Contamination.** The term "contamination" shall mean an impairment of water quality which creates an actual hazard to public health through the introduction of biological, chemical or nuclear agents.

- **Critical Level.** The term "critical level" shall mean the marking (C-L or C/L) on AVBs, PVBs and SVBs that determines the minimum elevation above the flood level rim of the fixture or receptacle served, as well as downstream piping and water uses, at which the assembly may be installed. When an AVB, PVB or SVB does not bear a critical level marking the bottom of the assembly shall constitute the critical level.

- **Cross-Connection.** The term "cross-connection" shall mean any unprotected actual or potential connection or structural arrangement between a potable water supply and any source through which backflow may occur and introduce any substance other than the intended potable water into the potable water system. The two types of cross-connections are:

  - Direct cross-connections which are subject to backpressure and backsiphonage.

- Indirect cross-connections which are subject to backsiphonage only.

- **(the) Director.** The term "Director" shall mean the Director of the Directorate of Public Works, United States Army Garrison, Hawaii, or a duly authorized representative.

- **Double Check Valve Backflow Prevention Assembly (DC).** The term "double check valve backflow prevention assembly" shall mean an approved assembly composed of two independently acting, approved check valves, tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with properly located resilient seated test cocks. This assembly shall only be used to protect against pollutant (non-health) hazards under backpressure and backsiphonage conditions. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Double Check - Detector Backflow Prevention Assembly (DCDA).** The term "double check - detector backflow prevention assembly" shall mean a specially designed assembly composed of a line sized approved DC with a bypass containing a specific water meter and an approved DC. The meter shall measure accurately for rates of flow up to two (2) GPM (gallons per minute) and shall show a registration for all rates of flow. This assembly shall only be used to protect against pollutant (non-health) hazards under backpressure and backsiphonage conditions. The DCDA is used primarily on fire sprinkler systems. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Double Check - Detector Backflow Prevention Assembly-Type II (DCDA-II).** The term "double check - detector backflow prevention assembly-type II" shall mean a specially designed assembly composed of a line sized approved DC with a bypass around the second check containing a specific water meter and a check valve. The meter shall measure accurately for only very low rates of flow up to two (2) GPM (gallons per minute) and shall show a registration for all rates of flow. This assembly shall only be used to protect against pollutant (non-health) hazards under backpressure and backsiphonage conditions. The DCDA is used primarily on fire sprinkler systems. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Hazard – Degree of.** The term "degree of hazard" shall mean either a pollutant (non-heath) or a contaminant (health) hazard and is derived from the evaluation of conditions within a system (Table 2 of enclosure 3).

- **Hazard - Health.** See **Contamination.**

- **Hazard - Non-health.** See **Pollution.**

- **Hazard - System.** The term "system hazard" shall mean an actual or potential threat of severe danger to the physical properties of the public or consumer's potable water system or of a pollution or contamination which would have a protracted effect on the quality of the potable water in the system.

- **Industrial Piping System – Consumer's.** The term "consumer's industrial piping system" shall mean any system used by the consumer for transmission of or to confine or store any fluid, solid or gaseous substance other than approved water supply. Such a system would include all pipes, conduits, tanks, receptacles fixtures, equipment and appurtenances used to produce, convey or store substances which are or may be polluted or contaminated.

- **Internal Protection.** The term "internal protection" shall mean the employment of the appropriate backflow prevention device within the consumer's potable water system at the point of use, commensurate with the degree of hazard.

- **Isolation.** See **Internal Protection.**

- **Manifold Assembly.** The term "manifold assembly" shall mean an assembly comprised of two (2) or more backflow prevention assemblies in parallel with a single inlet and outlet connection. The size of the manifold assembly shall be determined by the inlet and outlet connections. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Pollution.** The term "pollution" shall mean an impairment of water quality to a degree which does not create a hazard to the public health but which does adversely and unreasonably affect the aesthetic qualities of such water for domestic use.

- **Pressure Vacuum Breaker Backsiphonage Prevention Assembly (PVB).** The term "pressure vacuum breaker backsiphonage prevention assembly" shall mean an approved assembly containing an independently operating internally loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with properly located resilient seated test cocks. This assembly is designed to protect against pollutant and contaminant hazards, under a backsiphonage condition only. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Reclaimed (Recycled, Reused) Water.** The terms "reclaimed, recycled or reused water" shall mean water which, as a result of treatment of wastewater, is suitable for

a direct beneficial use or a controlled use that would not otherwise occur, and is not safe for human consumption.

- **Reduced Pressure Principle Backflow Prevention Assembly (RP, RPZ).** The term "reduced pressure principle backflow prevention assembly" shall mean an approved assembly composed of two independently acting, approved check valves, together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The assembly shall include tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with properly located resilient seated test cocks. This assembly is designed to protect against pollutant and contaminant hazards under backpressure and backsiphonage conditions. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Reduced Pressure Principle-Detector Backflow Prevention Assembly (RPDA).** The term "reduced pressure principle-detector backflow prevention assembly" shall mean a specially designed approved assembly composed of a line sized approved RP with a bypass containing a specific water meter and an approved RP. The meter shall measure accurately for rates of flow up to two (2) GPM (gallons per minute) and shall show a registration for all rates of flow. This assembly is designed to protect against pollutant and contaminant hazards under backpressure and backsiphonage conditions. The RPDA is used primarily on fire sprinkler systems. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Reduced Pressure Principle-Detector Backflow Prevention Assembly-Type II (RPDA-II).** The term "reduced pressure principle-detector backflow prevention assembly-type II" shall mean a specially designed assembly composed of a line sized approved RP with a specific bypass around the second check valve containing a specific water meter and an approved check valve. The meter shall measure accurately for rates of flow up to two (2) GPM (gallons per minute) and shall show a registration for all rates of flow. This assembly is designed to protect against pollutant and contaminant hazards under backpressure and backsiphonage conditions. The RPDA-II is used primarily on fire sprinkler systems. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Service Connection.** The term "service connection" shall mean the terminal end of a service connection from the public potable water system. If a water meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the water meter.

- **Service Protection.** The term "service protection" shall mean the protection of the public water system by the installation of the appropriate backflow prevention device

at the service connection to the consumer. The type of device will be based on the degree of hazard posed by that consumer.

- **Spill-Resistant Pressure Vacuum Breaker Backsiphonage Prevention Assembly (SVB).** The term "spill-resistant pressure vacuum breaker backsiphonage prevention assembly" shall mean an approved assembly containing an independently operating internally loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with a properly located resilient seated test cock and a properly located bleed/vent valve. This assembly is designed to protect against pollutant and contaminant hazards under a backsiphonage condition only. See Specifications, Section 10 of the Current USCFCCCHR Manual for additional details.

- **Water – Potable.** The term "potable water" shall mean water from any source which has been investigated by the health agency having jurisdiction, and which has been approved for human consumption.

- **Water Purveyor.** The term "water purveyor" shall mean the owner or operator of the potable system supplying an approved water supply to Department of the Army facilities. In this instance, United States Army Garrison, Hawaii, Directorate of Public Works.

- **Water Supply – Auxiliary.** The term "auxiliary water supply" shall mean any water supply on or available to the consumer's premises other than the water purveyor's approved public potable water supply.

- **Water System(s) – Consumer's.** The term "consumer's water system" shall mean any water system located on the consumer's premises whether supplied by a public potable water system or an auxiliary water supply.

Tables

Table 1 Backflow Prevention Assembly Installation Clearance Guidelines			
Minimum Distance From the Floor or Grade Level to the Bottom of the Assembly	Maximum Distance From Floor or Grade Level to the Centerline of the Assembly	Minimum Distance on One Side of the Assembly to Allow for Maintenance and Testing	Minimum Distance to Surrounding Obstructions
18"	60"	24"	12"
Installations elevated more than five (5) feet (1524 mm) above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance person.			

Table 2 Backflow Prevention Assembly General Application Guidelines						
	Pollutant (Non-Health)		Contaminant (Health)		Sewage and Recycled Water Systems	
	Backsiphonage	Backpressure	Backsiphonage	Backpressure	Backsiphonage	Backpressure
Air Gap	X	X	X	X	X	X
RP	X	X	X	X		
RPDA	X	X	X	X		
RPDA-II	X	X	X	X		
DC	**Fire Sprinklers Systems Classes 1, 2 and 3 Only!**					
DCDA						
DCDA-II						
PVB	X		X			
SVB	X		X			
AVB	X		X			

Table 3 Required Protection by Fire Suppression Class				
	Class 1	Class 2	Class 3	Class 4
DC	X	X		
DCDA All Types	X	X		
RP	X	X	X	X
RPDA All Types	X	X	X	X

Directorate of Public Works Backflow Prevention Assembly Test Report

Installation:		Facility:		Size (in):		Type:	
Manufacturer:		Model:		Serial Number:			

INITIAL TEST

By:		Tester #		Date:	

Reduced Pressure Principle Assembly			Line Pressure:		psi
Double Check Valve Assembly		Differential Relief Valve	Pressure Vacuum Breaker		
Check Valve #1	Check Valve #2		Air Inlet	Check Valve	
Held Tight at _____ psid	Held Tight at _____ psid	Opened at _____ psid	Opened at _____ psid	Held Tight at _____ psid	
Leaked ____	Leaked ____	Did Not Open ____ Leaked ____	Did Not Open ____	Leaked ____	

Repairs By:		Date:	

C-Cleaned R-Replaced

Item	C/R	Item	C/R	Item	C/R	Item	C/R	Item	C/R
Module		Module		Module		Module		Module	
Disc		Disc		Disc		Disc		Disc	
Spring		Spring		Spring		Spring		Spring	
Guide		Guide		Guide		Float		Guide	
Seat		Seat		Seat		Poppet		Seat	
Other		Other		Diaphragms		Other		Other	
				Other					

FINAL TEST

By:		Tester #		Date:	

Reduced Pressure Principle Assembly			Line Pressure:		psi
Double Check Valve Assembly		Differential Relief Valve	Pressure Vacuum Breaker		
Check Valve #1	Check Valve #2		Air Inlet	Check Valve	
Held Tight at _____ psid	Held Tight at _____ psid	Opened at _____ psid	Opened at _____ psid	Held Tight at _____ psid	

Function:		Does this assembly isolate the facility?	

Notes:

Signature of Final Tester and Date:

2a

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination remains in the system and water chemistry concerns are addressed.

Objective 2a - Water within the distribution system meets State and Federal DW MCLs, specified State EALs, and ISPs.

Incident Specific Criteria –

- Zone flushing plan demonstrates entire distribution system is flushed.
- Sample results show the water in distribution system meets State and Federal DW MCLs, specified State EALs, and ISPs. (Guidance Table 2 and Table 3)
- Drinking water does not show sheen, olfactory evidence, or other qualitative methods of petroleum.

Lines of Evidence	Completion Status	Outstanding Items	Notes
JBPHH water system's approach to flushing and their metrics for success.	Complete	Memorandum of record	Navy and Army to provide hydraulic model exhibits or a flushing line map and plan to show that the flushing approach will achieve directional flushing. Narrative of assumptions in the development of their flushing model inclusive of any simulations that they ran.
Validity of the volumetric exchange model	Complete	Documentation from Dr. Whelton.	Navy to provide documentation from Dr. Andrew J. Whelton or some other precedent (a case study or industry accepted guidance) showing that the volumetric exchange model is a viable flushing method. Navy to reach out to Dr. Whelton or his engineers to provide this information and inform him that DOH is also reaching out to EPA for advice on this.
Verification that the entire distribution system is flushed volumetrically.	Complete	Hydraulic model records of completed volumetric exchange targets by zone.	The hydraulic model output should show that this volumetric exchange goal was met. This includes providing documentation that shows: • Flushing of dead-end lines and flushing zone gaps meet the volumetric exchange goal based on which hydrants are selected. The model should also show that process does not allow water for flushing to be pulled from a contaminated zone.
Residential Sampling Report for Flushing Zone (Risk Management Summary)	Complete	Level 2 Data Validation.	Contingent upon receipt of the DOH data at Level 2 Data Validation.

2a.0

2a.0

Introduction to Section 2.0

The objective of Section 2.0 is to provide a level of evidence to amend the health advisory that the drinking water within the Zone I1 distribution system meets State of Hawaii and Federal Drinking Water standards Maximum Contaminate Levels, Environmental Action Levels and Incident Specific Parameters. Section 2.0 encapsulates Zone I1 distribution, non-residential and residential flushing. Flushing operations are summarized in the Memorandum of Record signed by the USAG Hawaii (USAG-HI) Department of Public Works section 2a.1. Zone I1 is a Drinking Water system that is operated and maintained by the Army. The Red Hill Shaft was shut down on 03 December 2021 and the Waiawa Shaft is the sole water source providing potable water to Zone I1 during flushing. The guidance provided by Dr. Whelton on the recommended volume exchanges to be flushed in the distribution system has been documented and provided in section 2a.2. More detail on the drinking water system, flushing operations and protocols followed is provided in the Hydraulic Model section 2a.3. The records of the distribution system volume exchanges flushed is provided in section 2a.4. The non-residential and residential flushing records are summarized in section 2a.5. Level 2 sampling data collected after distribution flushing is summarized in section 2a.6 and residential flushing data is summarized in 2a.7. The information provided in Section 2.0, including the flushing process followed and the subsequent sampling results demonstrate that water within the Zone I1 distribution system and plumbing in home and buildings meets State of Hawaii and Federal Drinking Water standards Maximum Contaminate Levels, Environmental Action Levels and Incident Specific Parameters.

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
DIRECTORATE OF PUBLIC WORKS
947 WRIGHT AVENUE, WHEELER ARMY AIRFIELD
SCHOFIELD BARRACKS, HAWAII 96857-5013

AMIM-HWP

7 February 2022

MEMORANDUM FOR Interagency Drinking Water System Team (IDSWT) Building C27, Nanumea Road, Naval Station Pearl Harbor, Joint Base Pearl Harbor-Hickam, Hawaii 96818

SUBJECT: Army Flushing Report for Zone I1

1. OBJECTIVE. This addendum provides additional technical information to document the system flushing methodology and engineering approach used to restore Zone I1 (Red Hill Housing) to service as requested by the State of Hawaii Department of Health (HI DoH). This memorandum and associated technical document (see Army Flushing Report for Zone I1) fully support the Drinking Water Distribution System Recovery Plan (DWDSRP) which was signed by the Interagency Working Group (IDWST) on 17 December 2021.

2. BACKGROUND.

2.1. Portions of the water distribution system serving Joint Base Pearl Harbor Hickam (JBPHH) and surrounding areas were exposed to low levels of fuel contamination with initial indications in the form of smell reports occurring on or about 28 November 2021.

2.2. Prior to the aquifer contamination incident, water users connected to the JBPHH system were supplied by three Navy owned water sources, Red Hill Shaft, Aiea/Halawa Shaft and Waiawa Shaft. In the time period prior to the incident, Waiawa Shaft was the main water source supplying approximately 16 million gallons per day (MGD) to the JBPHH system with at least one pump operating full time (100%). A single Red Hill Shaft pump was operated intermittently as a secondary source to supply approximately 5.5 MGD to the system. The Aiea/Halawa shaft was not being operated due to concerns over high chloride concentrations caused by saltwater intrusion into the aquifer.

2.3. On the evening of 28 November 2021, the Red Hill Shaft was secured and all pumping operations ceased. The Aiea/Halawa shaft briefly served as the secondary source starting on 28 November 2021 but was shut down on 03 December 2021 to prevent westward contaminant migration in the aquifer. This drinking water incident is attributed to the Red Hill shaft.

2.4. Since 03 December 2021, Waiawa Shaft has been the sole water source providing potable water to the distribution network. It is located 5.5 miles west of the Red Hill Fuel Facility and testing has not found any water quality issues at this source.

2.5. The Army owns and operates the Aliamanu Military Reservation (AMR) community water system (Public Water System ID: HI0000337) which is a consecutive system of the JBPHH water distribution system and was impacted by the incident. AMR is a residential community water system located in Oahu South area in the Aliamanu volcanic crater. It includes the Red Hill Housing residential area.

2.6. This memorandum is specific to Red Hill Housing also called Flushing Zone I1. Water is supplied to Red Hill Housing by the JBPHH water system via a 30" water main which is pumped to two (2) 250K storage tank and gravity fed to consumers. Red Hill Housing (I1) is hydraulically distinct after water is conveyed to the storage tank. A water distribution system diagram is provided in Enclosure 1.

3. Engineering Analysis and Tools. US Army Garrison-Hawaii (USAG-HI) utilized engineering judgement informed by existing tools and data sources such as ArcGIS, Supervisory Control and Data Acquisition (SCADA) system historic and current data, water system hydraulic model, and input from water system infrastructure contamination subject matter experts (SMEs) to include US Army Environmental Command (USAEC), US Army Corps of Engineers (USACE), and Naval Facilities Engineering Systems Command (NAVFAC) to develop water system flushing methodologies. The following text provides additional information on this analysis and tools.

3.1. ArcGIS was the primary tool used for mapping, volumetric calculations, and spatial analysis of the utility systems.

3.2. System flows were measured by meters at key points within the distribution system. Data was recorded and stored by the Navy's SCADA system historian. SCADA is also monitored 24/7 by water system operators.

3.3. A hydraulic model of Army assets was developed and iteratively refined over the last 3 years. However, model calibration is not possible as data requirements are not available, e.g., water meters on residences and, c-factors. Therefore, the model is skeletonized depicting major transmission lines to many areas of the zone. The model is considered to be of limited use in determining the overall effectiveness of system flushing.

3.4 Pressure data loggers were used at strategic locations in the distribution system to monitor flushing operations.

4. CONSTRANTS. The following constraints were considered during development of the plan:

4.1. Waiawa Shaft pumps are capable of pumping 19 million gallons day (MGD) with 2 pumps. There are 4 pumps at Waiawa Shaft, 2 are operational, one is standby, and one is down for maintenance. Average daily demand at JBPHH since the incident, and after water conservation measures were implemented, has ranged from 12 to 17 MGD. Maximum potable water system flushing flows were limited to 5 MGD to avoid excessive drawdown of the S1/S2 tanks and stay within the capacity of Waiawa Shaft pumps.

4.2. The two 6 million gallon (each) tanks, S1 and S2 could not be drawn down below the 28-foot level. This constraint was imposed by the water system operators who wanted to avoid low water system pressures that would be caused by S1/S2 drawdown below 28-feet.

4.3. Water service was required to be maintained for residents as well as fire protection services. Many families have remained in their homes and mission essential Government activities require continuous water service.

4.4. JBPHH and USAG-HI did not have an established unidirectional flushing plan developed prior to the incident. Unidirectional flushing typically involves inducing one-way flow through each pipe segment in a water distribution system by closing mainline isolation valves and opening hydrants for a short period of time. The number of hydrants required would be determined by the pipe size and the minimum water velocity required to flush sediments and

other contaminants from the pipe segment. True unidirectional flushing of the system was determined not to be a feasible method for flushing the potable water system for the following reasons:

4.4.1. The distribution system was to be recovered with critical urgency. Additionally, SMEs advised that the longer contaminants remained in the system, the more likely it was that they would migrate into plastics, gaskets, sediments, etc. A unidirectional flushing program would take several months to develop and implement and the timeline was not considered feasible for a return to service.

4.4.2. Water system operators indicated that many mainline isolation valves would not properly close and could not be relied upon to isolate pipe segments.

4.4.3. A single short duration flush of higher velocity flow through each pipe segment may be effective at removal of sediments from a single pipe segment. However, the method was considered to be less effective at system-wide removal of aqueous phase fuel contaminants than other options.

4.6. Flushing zones with higher risk of contamination were identified and prioritized using water user complaint history, testing results, the hydraulic model, and the hydraulic proximity to Red Hill Shaft. A factor of safety was applied to the highest priority zones by specifying a minimum of five volumetric turnovers. Army Zones were flushed with this safety factor.

5. Flushing Operations. Flushing plans are designed with a directional flush of the distribution system starting from the clean water source and moving systematically through the entire system. The limited water source capacity at Waiawa Shaft and disposal constraints required that the system be broken down into smaller flush zones. Four (4) total zones were established that could be independently flushed without adverse hydraulic or water quality impacts to previously flushed zones.

6. Flushing Zones. Detailed information, i.e., maps, calculations, data, are included in the Army Flushing Report-Zone I1 intended to accompany this memorandum.

6.1. Flushing Zone Commonalities.

6.1.1. Army tank volumes were cycled prior to flushing.
6.1.2. Flushing started at a hydrant and discharged into a sanitary sewer manhole.
6.1.3. Five (5) volume exchanges of the distribution pipes.
6.1.4. Systematic directional flow without operating valves.
6.1.5. Higher velocities required more hydrants and shorter runs of pipe to be flushed.
6.1.6. Every effort was made to account for elevation when flushing hydrants.

6.2. Specific Limitations. The Red Hill Housing (Zone I1) neighborhood is limited to 200 gallons per minute (gpm) due to wet well size and pump capacity. Two hydrants were flushed at a time due to sewer capacity and City and County of Honolulu Temporary discharge permit allowance.

6.3. Water Users. Residential housing represents the dominant water user in Army flushing zones. In addition to residential housing, there are other small non-residential facilities located within Red Hill Housing Area, Zone I1.

6.4. Volume. In consultations with professionals a recommendation of three volumetric turnovers for impacted pipe networks was established. A factor of safety was applied to the highest priority zones by specifying a minimum of five volumetric turnovers.

Zone I1= 17,000 (kgals) , 5 volumes = 85,200 (kgals)

7.0. Residential Flushing. Zone I1 flushing of 137 homes in the Red Hill residential community was accomplished over a four (4) day period. The original intent was to complete residential flushing within 2 calendar days, i.e., 10 and 11 January. However, it was determined on 11 January via quality control checks by USAG Hawaii Department of Public Works (DPW) and Island Palm Communities (IPC) that documented residential flushing times were inconsistent with the agreed Standard Operating Procedure (SOP). Specifically, a stand-alone or duplex home has an absolute minimum flush time; 72 residences did not meet the minimum flush time requirement. Conversations with Task Force Ohana (Flushing Team) indicate flushing was done properly. However, steps articulated in the SOP were accomplished out of sequence (water heaters not flushed in the right sequence) and not adequately documented. Therefore, 72 homes were re-flushed in accordance with the prescribed SOP. A limited number of concerns were identified during the residential flushing: (1) low pressure; (2) COVID quarantined residents; (3) unsecured pets; and (4) resident plumbing and other technical issues. Concerns are documented in Enclosure 5 Residential Flushing Worksheet. Residential flushing for Zone I1 is complete.

8.0. Non-Residential Flushing. Non-residential flushing is complete. Flushing was done in accordance with the SOP and records are provided in the Enclosure 7 Army Flushing Report for Zone I1.

9.0. Water Quality Data. The Army must comply with parameters identified by the IDWST and are provided in the accompanying Enclosure 6 Water Quality Data & Sampling Plan. All samples are within the Department of Health Groundwater Action Levels, Department of Health Safe Drinking Water Act Regulatory Constituents and the US Environmental Protection Agency Maximum Contaminate Levels (MCLs) for drinking water. Samples collected in residential housing after the residential flushing did exceed the incident specific parameter of 2.9 parts per billion (ppb) for Copper. The likely source of copper is corrosion of household plumbing systems and/or erosion of natural deposits from the flushing event. The copper samples are well below the regulatory MCL drinking water standard of 1300 ppb. The Army will continue to sample and report copper samples in the annual consumer confidence report. Mercury was detected in one of the samples. The sample that detected mercury is below the regulatory drinking water MCL of 2 ppb and is a laboratory estimated value.

10.0. Re-flushing. During residential flushing of Zone I1 it was identified that 72 residences did not meet the minimum flush time requirement. Therefore, these homes were re-flushed flowing the prescribed SOP and flush times documented.

11.0. Point of Contact. Please refer any questions regarding this memorandum to the undersigned.

SUBJECT: Army Flushing Report for Zone I1

2/7/2022

X Nisit A. Gainey

Signed by: GAINEY.NISIT.ANTHONY.1067651371

NISIT A. GAINEY
Director, Public Works

7 Encls
1. Water System Diagram
2. Flushing Map All Zones
3. Worksheet for Flushing Volumes
4. Residental Flushing Maps
5. Residential Flushing Worksheet
6. Water Quality Data & Sampling Plan
7. Army Flushing Report for Zone I1

SUBJECT: Army Flushing Report for Zone I1

Enclosures

Enclosure 1	Water System Diagram	Enclosure 1 Water System Diagram
Enclosure 2	Flushing Map All Zones	Enclosure 2 Flushing Map All Zones
Enclosure 3	Worksheet for Flushing Volumes	Enclosure 3 Worksheet for Flushing Volumes
Enclosure 4	Residential Flushing Maps	Enclosure 4 I1Residential Flushing Maps
Enclosure 5	Residential Flushing Worksheet	Enclosure 5 Residential Flushing Worksheet
Enclosure 6	Water Quality Data	All sample data can be found in EDMS the database of record
Enclosure 7	Army Flushing Report for ZONE I1	Army Flush Report Zone I1-February 2022

From: Whelton, Andrew J <awhelton@purdue.edu>
Sent: Saturday, January 8, 2022 4:58 AM
To: Lee, Andre K (NAVFAC HI BD) CIV USN NAVFAC HAWAII PEARL (USA) <andre.k.lee4.civ@us.navy.mil>
Cc: Isaacson, Kristofer P <isaacsok@purdue.edu>; Proctor, Caitlin Rose <proctoc@purdue.edu>
Subject: [URL Verdict: Neutral][Non-DoD Source] RE: Cross Connection Control Plan and Flushing Plan documentation requirements for DoH

LCDR Daly,

I am free to talk later this afternoon today if you want. I'm Mountain Standard Time.
Below is some information.

Andy
540-230-6069

FEEDBACK

1. You applied unidirectional flushing and if you opened hydrants fully you likely maximized velocity in the pipes you were flushing. The issue they seem to be getting at is scouring velocity which you identify. This is used for removing sediment (typical cleaning of water pipes) as you know. There is no SOP for water contamination response and recovery, so you applied standard water distribution system maintenance practice of unidirectional flushing. This is good. The state I think invoked water main disinfection standard which, to my knowledge isn't applicable here unless you conducted shock disinfection.
    a. For perspective, per a Water Research Foundation study: Microbial Control Strategies for Main Breaks and Depressurization, Project 4307. Published 2014. Denver, Colorado.
        1. Scouring velocity helps removed sediment from water mains/pipes. To achieve 2.5 to 3 log removal of sand particles for 4-to-16-inch diameter PVC pipes, 3 ft/s is needed.
        2. In that report, to achieve this removal for a 6-inch diameter PVC pipe, Q was 308 GPM
        3. In that report, to achieve this removal for 4-inch diameter PVC pipe, Q was 137 GPM
    b. We recommended starting flushing from the clean water source and moving systematically through the entire system in a unidirectional way. If you all did this, be sure to explain that. That helps minimize the change residual "old" water gets untouched, or is left in the system.
    c. You could calculate scouring velocities in each of the areas. If any are lower than desired you can go back and just keep repeat flushing giving an added level of safely.
    d. The state's interest in scouring velocity may be of concern that (JP-5?) free product adsorbed to sediment/scales and they want to be certain it got scoured out. If it didn't, it could dissolve it's constituents into water over time.
    e. Dead-ends are really important. You need to specifically address how you will get that water out. In West Virginia, many weeks after the spill and utility had flushed out the black-licorice smelling contaminated water out someone in a distal part of the system complained about odor. To my recollection the utility thought it was psychological, but it turned out there was a dead-end they didn't flush. Somehow that contaminated water got drawn into a nearby home and someone was exposed.

f. Question: How long was each hydrant open typically?
g. I think we mentioned flushing 3 times the pipe volume. Rules of three is what I often recommend. Flushing velocity is certainly important. I vaguely remember NAVFAC had contracted a consultant to create the flushing plan.

2. JP-5 isn't a single contaminant which we've talked about before. It's a mixture of 100s-1000s of individual chemicals. Even if JP-5 itself is hydrophobic and primarily found in emulsions or floating on the surface, some of these constituents will still diffuse into the water itself. The question they are likely after is how do you know you removed all parts of JP-5 that may have gotten entrained in the water system? This goes back to what chemicals are you testing for in the water distribution system. JP-5 constituents have different water solubility and octanol-water partitioning coefficients (Log Kow = How much they like to be in biofilm and plastics, not water). Additionally, the different materials (Metal vs PVC vs HDPE vs. gaskets) may be more prone to soaking up some JP-5 contaminants and not others depending on their characteristics. For example, PVC has been shown to be less susceptible to soaking up some crude oil-based contaminants than HDPE pipes (Huang et al. study with Whelton). Ultimately, the fate of the chemicals in the drinking water system will not be the same for all JP-5 constituents. Remember the drawing I drew on the whiteboard when meeting with CDR Chase, NAVFAC, COE, and Army? It showed different constituents may be in different parts of the water system. That's what DOH is likely after. Question to you: What wide screen testing have you done in the water distribution system since December 22? This can help you hunt down that the contaminants are present or gone.

3. Escalation should be based on how much flushing you are okay with trying. If you want to remove and replace infrastructure (that has sometimes happened after other contamination events on the mainland and overseas), it's a viable but laborious option. As an extreme example, following the Camp Fire it was estimated it would take over a year of continuous flushing to return some contaminanted pipes to safe use, so for some conditions they removed and replaced pipes. However, this flushing timeline will vary significantly depending on the water distribution systems and water testing results – AND chemicals or individual JP-5 constituents present. If I knew what the chemicals were still being found and what was done to try to get rid of them, I could give a more informed opinion. Food grade surfactants were used in Israel after a drinking water contamination incident...BUT using surfactants is not trivial and can cause all sorts of damage to water system components and leave residual. This probably isn't an email, but more discussion. Happy to talk. If you decide you want to go this way we should be more engaged technically in what this means. It's not likely an email response/effort, but more involved.

4. Here's a paper where we reviewed petroleum (and other material) drinking water distribution and plumbing contamination incidents and flushing Decontaminating chemically contaminated residential premise plumbing systems by flushing - Environmental Science: Water Research & Technology (RSC Publishing) DOI:10.1039/C5EW00118H. Unfortunately, when we went to

review the underlying evidence of each incident, often the utility and state didn't document much. Even incidents overseas had little documentation. It seems groups simply tried something, it did or didn't work, and they moved on. They also didn't sample much and rarely it an entire water distribution system that was affected.

Again, I can get on a zoom call or phone this afternoon MST to connect. I was called into the Colorado wildfires to help the communities identify and design water sampling and recovery plans. We're getting data every day and meeting with state and federal agencies. This is the Marshall Fire and Middle Fork Fire. I apologize for the delayed response.

Andy

Cell/text: 540-230-6069

2a.3

ARMY FLUSHING REPORT FOR RED HILL HOUSING AREA ZONE I1

February 2022

TABLE OF CONTENTS

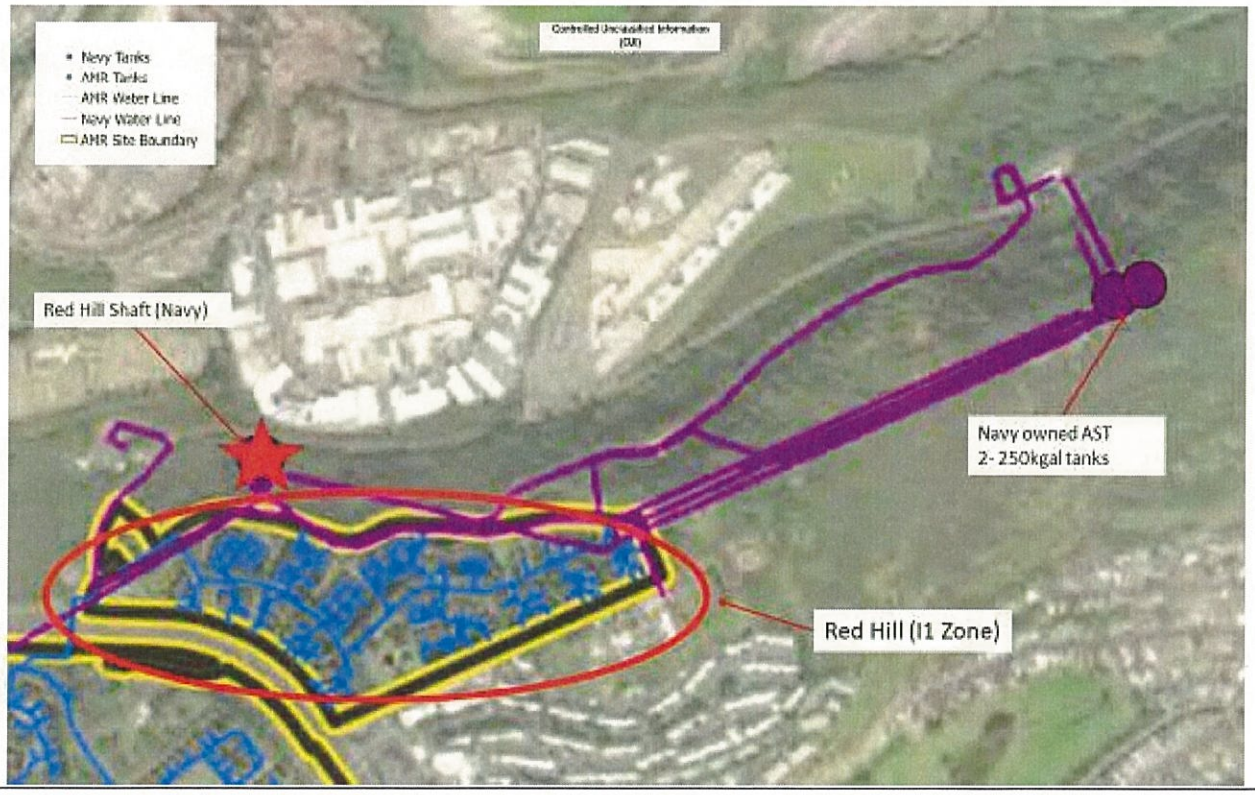
DRINKING WATER SYSTEM-BACKGROUND

The Army-owned Aliamanu Community Water System (public water system ID: HI0000337) is a consecutive system of the U.S. Navy Pearl Harbor water distribution system. The Aliamanu water system has a population served of 6,406 and average daily potable water consumption is approximately 1,136,000 gallons. Drinking water for Red Hill Housing & Aliamanu Military Reservation (AMR) is supplied by the Pearl Harbor Water System. The drinking water is obtained from three groundwater sources: Waiawa Shaft, Red Hill Tunnel, and Halawa Shaft. Two 6-million gallon finished water storage tanks (Halawa Storage Tanks) serve as the water source. The Aliamanu Community Water System is broken into 4 Zones: Red Hill Housing (Zone I1), and AMR Housing (Zone H1, H2, and H3). This flush report focuses only on Red Hill Housing Zone I1.

The water is chlorinated and fluoridated at the Pearl Harbor water treatment plant. There is no further treatment before the water is distributed to the Aliamanu and Red Hill residents.

Water is supplied to Red Hill Housing by the JBPHH water system via a 30" water main which is pumped to two (2) 250K storage tank and gravity fed to consumers. Red Hill Housing (Zone I1) is hydraulically distinct after water is conveyed to the storage tank.

MAP OF THE DRINKING WATER STORAGE TANKS:



A U.S. Army Corps of Engineer project is currently underway to construct two Granulated Activated Carbon (GAC) filters that run in parallel at the Red Hill Housing Zone I1 that will filter 150,000 gallons/day each. The project is not complete and will be commissioned and implemented only with Hawaii Department of Health approval.

2021 CONSUMER CONFIDENCE REPORT (2020 SAMPLING DATA) FOR AMR Community Water System:

2021_CCR_337_AMR_FINAL.pdf

HYDRANT WATER MAINS FLUSHING NARRATIVES

ZONE I1 (RED HILL):

U.S. Army Garrison-Hawaii (USAG-HI) utilized engineering judgement informed by existing tools and data sources such as ArcGIS, Supervisory Control and Data Acquisition (SCADA) system historic/current data, hydraulic models, and input from water system infrastructure contamination subject matter experts to include U.S. Army Environmental Command (USAEC), US Army Corps of Engineers (USACE), and Naval Facilities Engineering Systems Command (NAVFAC) to develop water system flushing methodologies.

See Memorandum of Record dated February 2022 for methodology outline.

Memo for Flushing CUI 20220120 V1-Zone I1

AMR FLUSHING MAP:

AMR_Flushing_Map_wSewer_12282021_address

HYDRANT SAMPLE POINTS:

AMR_Flushing_HydrantSamplePts_01082022_rd

WATER MAINS HYDRANT FLUSHING (ZONE I1):

This section summarizes flush records for distribution system flushing in Zone I1 (December 2021). The AMR #1 flushing log contains the flow rates for ZONE I1.

HYDRANT FLUSHING STANDARD OPERATING PROCEDURE:

Water SOP.docx

ALIAMANU MILITARY RESERVATION FLUSH LOG TO INLCUDE ZONE I1 FLOW RATES

AMR Flushing Log #1.xlsx

ALIAMANU MILITARY RESERVATION FLUSH VELOCITES TO INCLUDE I1 FLOW RATES:

AMR Flushing Log #1 VELOCITIES.xlsx

ALIAMANU COMMUNITY WATER SYSTEM FLUSH 1 FIELD NOTES:

This section is providing the written field notes from the first flush (December 2021). The start and stop time was recorded and the volume. A full log of the volume flushed is provided in the flushing logs.

Figure 2: Day 1b Flush 1

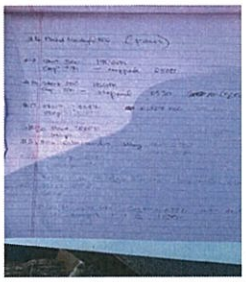


Figure 3: Day 1c Flush 1


Figure 4: Day 2 Flush 1

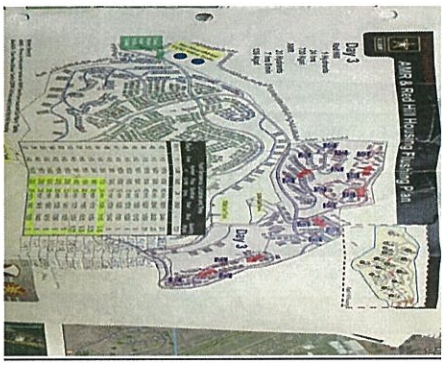


Figure 5: Day 3 Flush 1

RESIDENTIAL FLUSHING RED HILL (ZONE I1):

Zone I1 flushing of 135 homes in the Red Hill residential community was accomplished over a four (4) day period. The original intent was to complete residential flushing within 2 calendar days, i.e., 10 and 11 January. However, it was determined on 11 January via quality control checks by USAG Hawaii Department of Public Works (DPW) and Island Palm Communities (IPC) that documented residential flushing times were inconsistent with the agreed Standard Operating Procedure (SOP). Specifically, a stand-alone or duplex home has an absolute minimum flush time; 72 residences did not meet the minimum flush time requirement. Conversations with Army Flushing Team indicated flushing was done properly. However, steps articulated in the SOP were accomplished out of sequence (water heaters not flushed in the right sequence) and not adequately documented. Therefore, 72 homes were re-flushed in accordance with the proscribed SOP. A limited number of concerns were identified during the residential flushing: (1) Low pressure; (2) COVID quarantined residents; (3) unsecured pets; and (4) resident plumbing and other technical issues. All concerns are documented in the enclosure 'Zone I1 4 days of Residential Flushing'. Residential flushing for Zone I1 is complete.

HOME FLUSHING PLAN CHECKLIST AND SOP

Home-Flushing-Plan-Checklist-and-Standar

SUMMARY OF 4 DAYS OF RESIDENTIAL FLUSHING:

Zone I1 4 days of Residential Flushing

NON-RESIDENTIAL FLUSHING RED HILL (Zone I1):

Non-residential flushing for Zone I1 is complete. A total of 7 non-residential buildings were flushed following the non-residential Standard Operating Procedure (SOP). The check-list for each non-residential facility flushed in Zone I1 is provided below. The Navy flushed Red Hill Elementary School. The other non-residential buildings were flushed by USAG Hawaii-Department of Public Works.

NON-RESIDENTIAL FLUSHING STANDARD OPERATING PROCEDURE (SOP):

FINAL NON-RESIDENTIAL FL

RED HILL AQUA ENGINEERING SEWAGE PUMP STATION 1:

I1_W37_CG1 Sewer Pump Station

RED HILL SPRAY PARK:

I1_NA_Red Hill Spray Park

RED HILL ISLAND PALM COMMUNITY CENTER AND GARAGE:

I1_73140 73141_Red Hill Community Center and Garage

RECREATION BUNKER

I1_559_Recreation Bunker

ISLAND PALM COMMUNITY RED HILL WAREHOUSE

I1_1_IPC Icarus Warehouse

CROSS CONNECTION PLAN & BACKFLOW RECORDS

Zone I1 has one facility that stores petroleum products. Building 2001 is owned/operated by the Aqua Engineers and has two aboveground storage tanks (1000 and 200 gallons respectively) with diesel fuel for generators. This facility is isolated from the drinking water distribution system by a pair of backflow prevention devices.

BACKFLOW TESTING RECORDS

(2) USAG-HI AMR BFPD Test Reports

ISLAND PALM COMMUNITIES (IPC) LIST OF BACKFLOW DEVICES ON AMR WHICH INCLUDES ZONE I1

IPC Backflow Devices

CROSS CONNECTION PLAN

(3) DPW_Cross-Connectic

(4) XCCP Plan Update_Draft.pdf

DPW INVENTORY OF BACKFLOW DEVICES ON AMR WHICH INCLUDES ZONE I1:

(1) USAG-HI AMR BFPD Inventory (Zone I1 Highlights)

ZONE I1 "AMR-RED HILL" MAP OF BACKFLOW DEVICES:

AMR-Red Hill Map of BFPAs

BFPD_Overall_Map_01282022_rev_rd

INDUSTRIAL WASTEWATER DISCHARGE PERMIT FOR TEMPORARY DISCHARGE INTO THE CITY SEWER SYSTEM-FLUSH RECORDS

The section summarizes the discharge records taken to ensure compliance with the temporary discharge permit into the sanitary system.

PERMIT NUMBER 21TU008R3

Permit 21TU008R3 (Digital Copy) - AMR ;

VOLUME CALCULATIONS (FOR ALL ZONES-tab I1 Red Hill):

5Pipe-flush-Vol Calcs - 12-24-2021.xlsx

AMRFlushing - Volume Calc - 12-3-2(

CCH Dept ENV Services_TDSMR_2021

CCH Dept ENV Services_TDSMR_2022

ARMY SAMPLING DATA

Sampling was conducted following the sampling plan prepared by the Navy, Army, State of Hawaii Department of Health, and the United States Environmental Protection Agency.

The samples were collected by AECOM personnel and were analyzed at Eurofins TestAmerica, in Seattle, Washington, for volatile organic compounds (VOCs) by EPA Method 8260D, semivolatile organic compounds (SVOCs) by EPA Method 8270E, and/or total petroleum hydrocarbons (TPHs) by EPA Method 8260/CALUFT (gasoline-range, C6-C12 hydrocarbons) and EPA Method 8015D (diesel range, C9-C25 hydrocarbons, and motor oil range, C24-C40 hydrocarbons). The analyses were performed in general accordance with the methods specified in EPA's Test Methods for Evaluating Solid Waste (SW-846).

All sampling data collected and validated for Zone I1 can be found in EDMS the database of record for sampling data.

SAMPLING PLAN

Drinking-Water-Sampling-Plan-Addendum_

FLUSHING MAP WITH PRESSURE GRAPHS RED HILL HOUSING Zone I1

Below is a summary of the data the Army was able to collect with pressure data loggers. Low pressure abnormities were identified in the Zone I1 Red Hill housing area flushing event. Data loggers were placed on hydrants to monitor the pressure during the flushing events. Upon further investigation into the source of the pressure abnormalities it was determined a failed pressure reducing valve (PRV) needed to be repaired. The PRV was fixed on 25 January 2022 and pressure has stabilized in Zone I1 (reflected in Figure 4).

FIGURE 1: Zone I1 RED HILL FLUSHING LIMITATIONS

The Red Hill Housing (Zone I1) neighborhood is limited to 200 gallons per minute (gpm) due to wet well size and pump capacity. Two hydrants were flushed at a time due to sewer capacity and City and County of Honolulu Temporary discharge permit allowance.

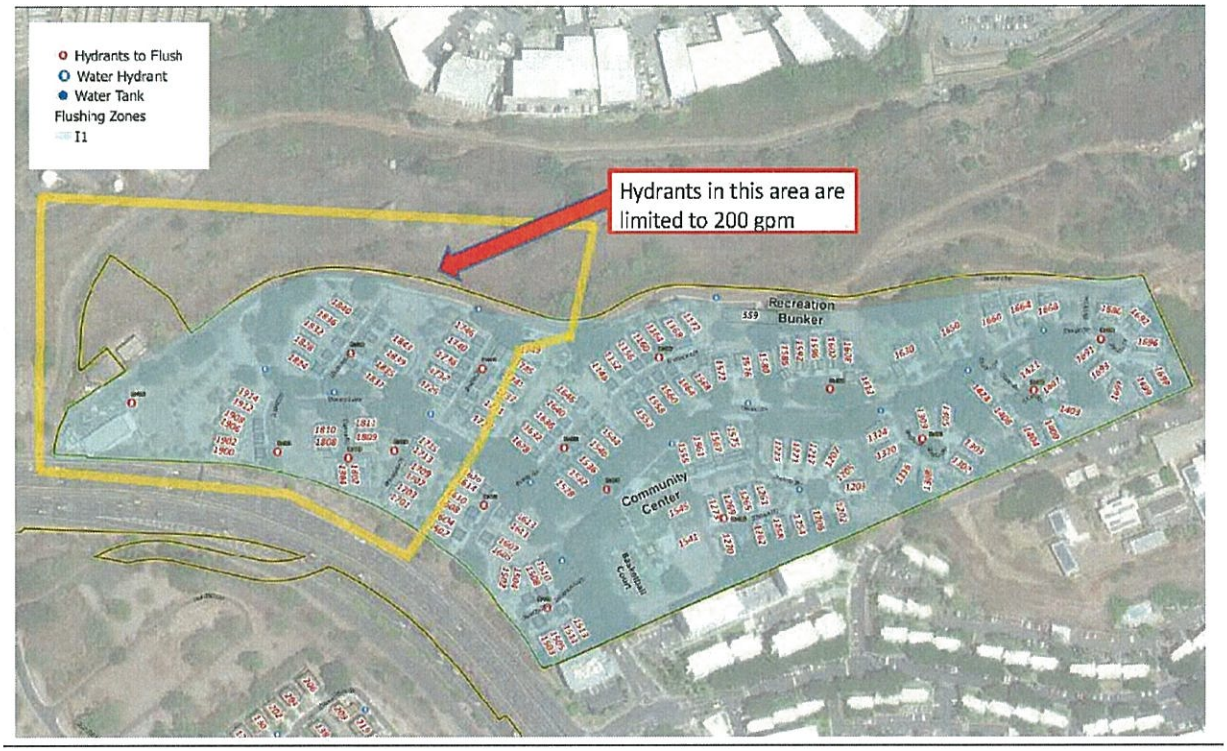


FIGURE 2: Zone I1 RED HILL FLUSHING MAP WITH PRESSURE GRAPHS

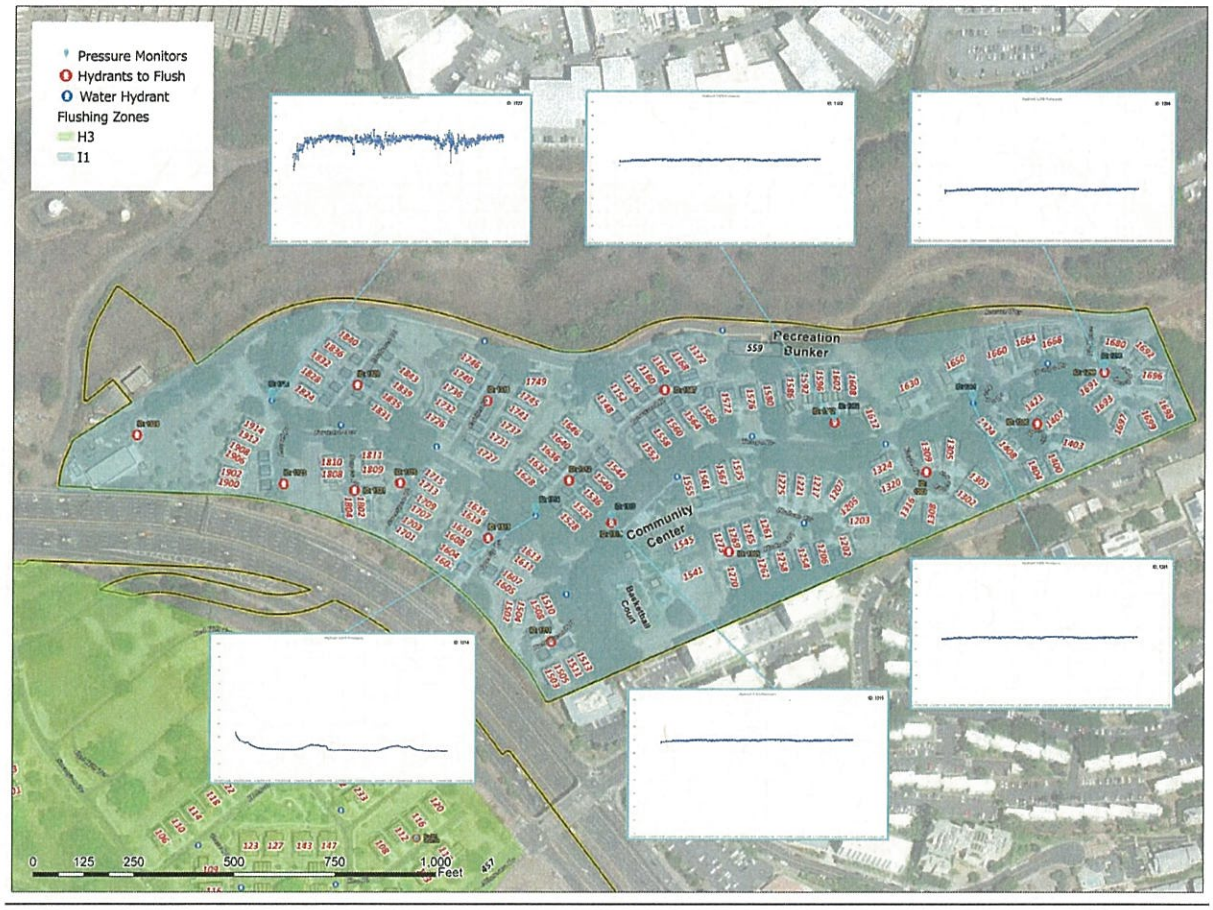


FIGURE 3: HOMES IN Zone I1 RED HILL HOUSING WITH POTENTIAL LOW PRESSURE

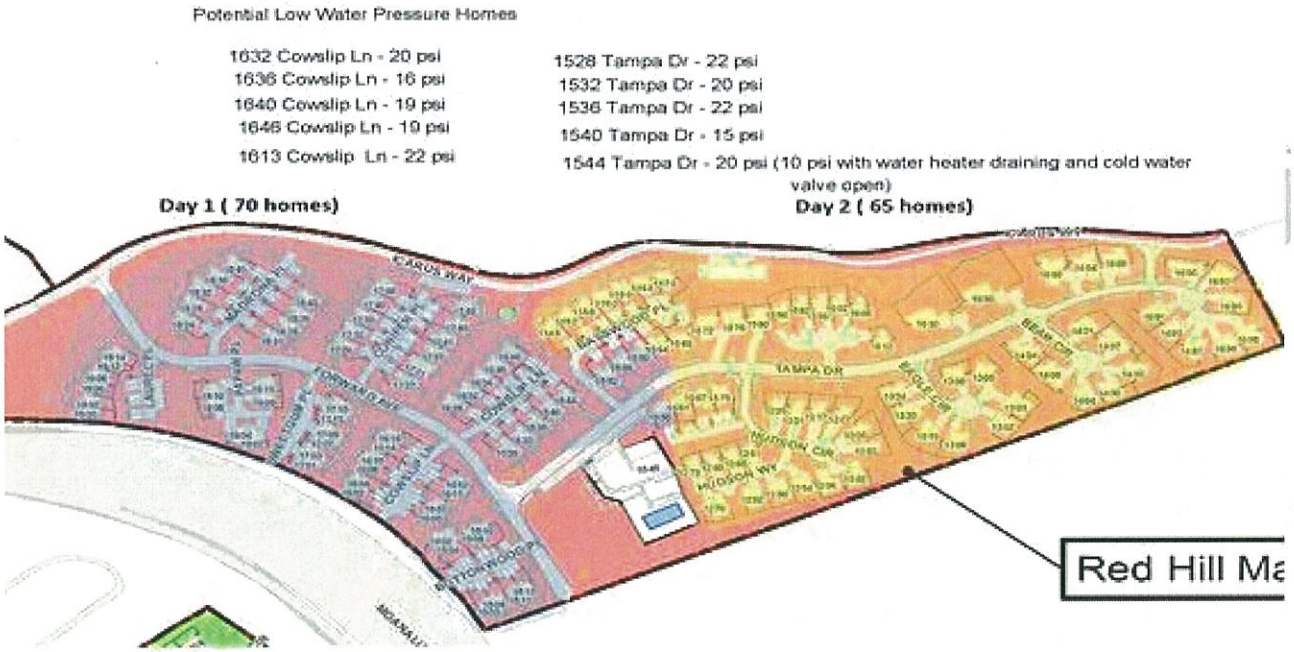
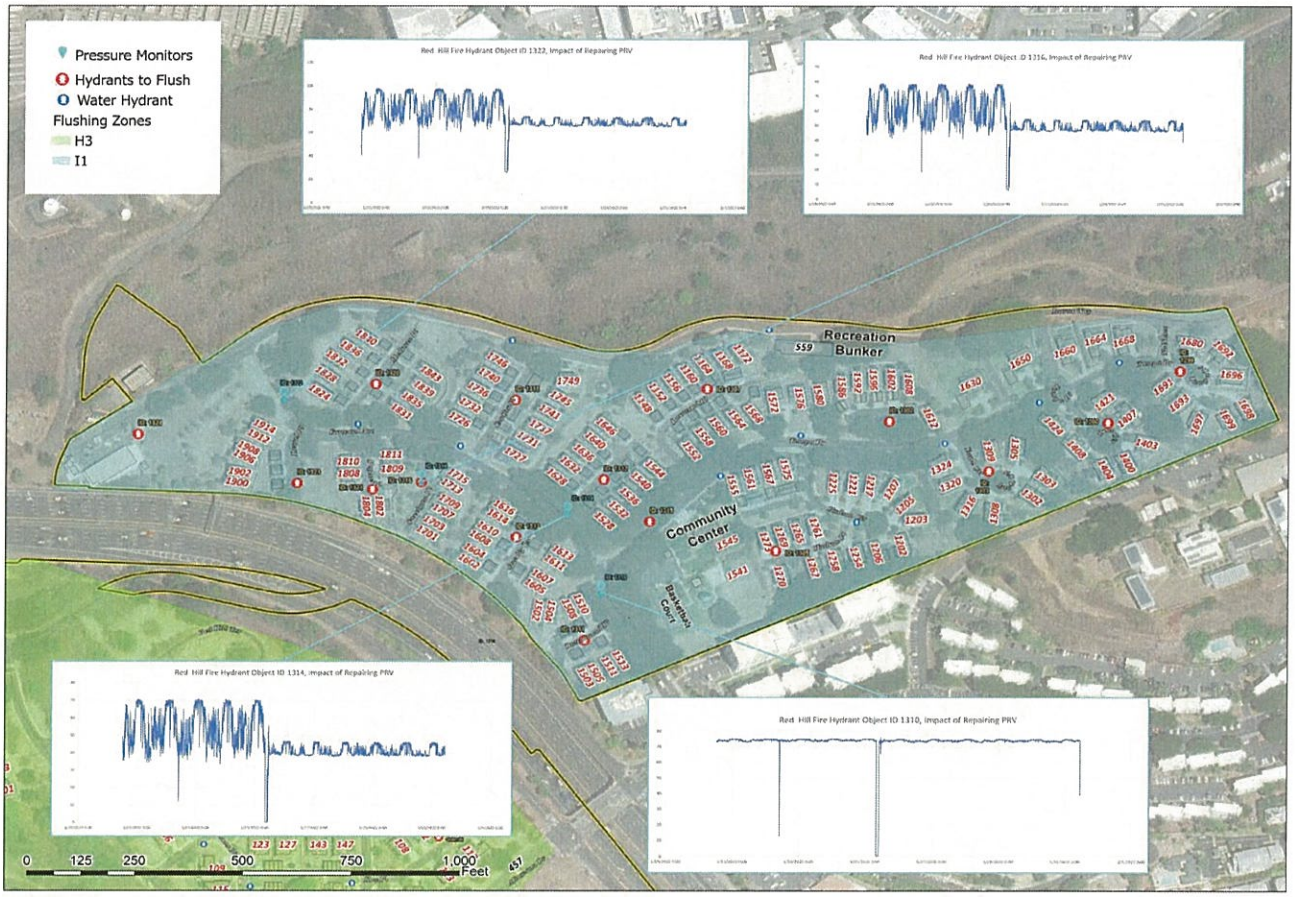


FIGURE 4: WATER PRESSURE GRAPHS IN Zone I1 RED HILL HOUSING AREA AFTER THE PRESSURE REGULATOR VALVE REPAIR



2a.4

February 13, 2022

From: Naval Facilities Engineering Systems Command Representative, IDWS Team
To: Interagency Drinking Water System Team

SUBJ: WATER STORAGE FACILITIES AND WATER SOURCE FOR ZONE I1

Ref: (a) Drinking Water Sampling Plan, December 2021
(b) Drinking Water Distribution System Recovery Plan, December 2021

Encl: (1) Joint Base Pearl Harbor Hickam Potable Water System Description
(2) S1 and S2 Water Storage Tank Flushing Report Memo

1. This letter and associated enclosures describes and documents the flushing of the water storage facilities that serve the Joint Base Pearl Harbor Hickam (JBPHH) potable water system. The flushing of the JBPHH water storage facilities and distribution system was completed in accordance with reference (a) and (b). Enclosure (1) describes the JBPHH Potable Water System and storage tanks associated with the system. Page 8 of reference (a) has the flushing zones and water storage facilities located in each zone. The flushing of each zone identified in phase 1 of reference (a) included five volumetric turnovers. The volumetric turnover requirement included the water tank storage and distribution system volume for each zone. The water testing of the distribution system after flushing a zone's water storage tank and distribution system was the confirmation that contamination was removed from the system and that the water tanks was not a source of contamination. Enclosure (2) documents the Hawaii Department of Health's approved change from reference (a) for the flushing of Halawa S-1 and Halawa S-2.

2. Zone I1 has the Red Hill water storage tank which feeds the Red Hill Housing area. The Red Hill water storage tank water is delivered by booster pumps located at the Red Hill Water Plant. The booster pumps draw water from the distribution system which is currently fed by the Waiawa Shaft water supply source and water stored in the Halawa S-1 tank since the Halawa S-2 tank has been taken offline for maintenance as documented in enclosure (2). Water being distributed in the system and being stored in water storage tanks that feed Zone I1 have been flushed in accordance with reference (b) and the distribution system tested in accordance with reference (a).

3. I certify under penalty of law that I have personally examined and I am familiar with the information submitted and the submitted information is true, accurate, and complete.

MENO.MICHAEL.WAYNE.JR.1088310035
Digitally signed by MENO.MICHAEL.WAYNE.JR.1088310035
Date: 2022.02.13 11:32:28 -10'00'

M. W. Meno
Captain, U.S. Navy Civil Engineer Corps

February 13, 2022

Joint Base Pearl Harbor Hickam (JBPHH) Potable Water Description

Major components of the JBPHH potable water system include:

- Supply sources
  - Waiawa Shaft/Pumping Station
  - Red Hill Shaft/Pumping Station
  - Halawa Shaft/Pumping Station
  - Emergency Interconnections (5 locations)
- Water storage facilities
  - 2-6,000,000 gallon steel storage tanks at Halawa
  - 2-200,000 gallon concrete storage tanks at Camp Smith
  - 1-250,000 gallon glass-fused steel storage tank at Camp Smith with a usable storage capacity of 140,000 gallons
  - 1-250,000 gallon glass-fused steel storage tank at Red Hill
- Distribution system
  - Camp Smith Booster Pump (to convey water to the Camp Smith water system)
  - Red Hill Booster Pumps (to convey water to the storage tank)
  - Moanalua Terrace Booster Pumps (to pressurize the water system serving the Moanalua Terrace Housing area)
  - Boneyard Booster Pumps (to pressurize the water system serving the upper elevation portion of Moanalua Terrace Housing area)
  - Manana Booster Pumps (to pressurize the water system serving the Manana Housing area)
  - A network of pipes, meters, valves, and hydrants for distribution and fire protection

Water Storage Facilities:
Fresh water storage facilities store water for normal, fire, and maximum demand use, and serve to maintain relatively constant pressure in the water system. The JBPHH water system is equipped with two welded steel tanks, each with a storage capacity of six million gallons. These tanks are identified as the Halawa storage tanks S-1 and S-2. Both of these tanks are located adjacent to the Aliamanu Military Reservation at a ground elevation of 140 feet. The diameter of the tanks are 164 feet each, with a nominal height of 48 feet. The spillway elevations of the S-1 and S-2 tanks are 178.5 feet. The tanks are interconnected by a 10-inch line. Water from each of the tanks discharges through separate 24-inch mains and combines to a single 30-inch transmission main.

Other water storage tanks in the JBPHH system include the three tanks at Camp Smith, a storage tank serving the Red Hill Housing area, and a storage tank serving the Army's Aliamanu Housing area. The Red Hill and Aliamanu tanks are supplied by separate booster pump stations located at the Red Hill Water Pumping Station and the Halawa Storage Tanks, respectively. These tanks are dedicated to serving these two non-Navy housing areas.

February 11, 2022

From: Naval Facilities Engineering Systems Command Representative, IDWS Team
To: Interagency Drinking Water System Team

SUBJ: S1 AND S2 WATER STORAGE TANK FLUSHING REPORT

Ref: (a) Drinking Water Distribution System Recovery Plan, December 2021

1. This letter documents the current status of the S1 and S2 water storage tanks. In accordance with reference (a), the S1 and S2 water storage tanks were part of the Zone F1 flushing plan. The flushing plan for Zone F1 included both water storage tanks in the five volumetric turnover calculations. The calculated turnover volume was 61.35 million gallons of water. The S1 tank was flushed by cycling the water tank for five volumetric flushes. In order to conserve the amount of water being used in the flushing of Zone F1, the S2 water storage tank was taken out of service and remains out of service to date. This decision resulted in the conservation of approximately 25 million gallons of water. The Hawaii Department of Health (HDOH) was notified of the Navy's modified flushing plan and provided concurrence. The S2 water storage tank is being scheduled for cleaning and maintenance. The Navy will provide details to HDOH on the method and procedures for cleaning and maintenance of the S2 water storage tank prior to the start of work. The Navy will notify the HDOH upon completion of the work and the tank being placed back into service.

2. I certify under penalty of law that I have personally examined and I am familiar with the information submitted and the submitted information is true, accurate, and complete.

MENO.MICHAEL.WAYNE.JR.1088310035
Digitally signed by MENO.MICHAEL.WAYNE.JR.1088310035
Date: 2022.02.12 14:33:42 -10'00'

M. W. Meno
Captain, U.S. Navy Civil Engineer Corps

NAVY LINES TO I1 - 5 VOLUME TARGET = 4100 KGAL

ARMY FLUSH LOG FOR SYSTEM FLUSH #1

Red Hill 1 (RH1)									
Location	Date	Day	Start	Stop	Duration (hrs - min)	Duration (min)	Rate (gpm)	Volume (Kgal)	Cum Vol (Kgal)
RH1	12/20/2021	Monday	0947	1800	8 h 47 m	527	200	105.4	105.4
RH1	12/21/2021	Tuesday	0800	2400	16 h 0m	960	232.56	223.26	328.7
RH1	12/22/2021	Wednesday	0000	2400	24 h 0 m	1440	236.21	340.14	668.8
RH1	12/23/2021	Thursday	0000	2400	24 h 0 m	1440	235.45	339.05	1,007.8
RH1	12/24/2021	Friday	0000	2400	24 h 0 m	1440	229.86	331.00	1,338.8
RH1	12/25/2021	Saturday	0000	2400	24 h 0 m	1440	237.97	342.67	1,681.5
RH1	12/26/2021	Sunday	0000	2400	24 h 0 m	1440	238.50	343.43	2,024.9
RH1	12/27/2021	Monday	0000	831	8 h 31 m	511	241.90	123.61	2,148.6

Red Hill 4 (RH4)									
Location	Date	Day	Start	Stop	Duration (hrs - min)	Duration (min)	Rate (gpm)	Volume (Kgal)	Cum Vol (Kgal)
RH4	12/20/2021	Monday	-	-	-	0	0	0	0
RH4	12/21/2021	Tuesday	0900	2400	15 h 0m	900	293	263.7	263.7
RH4	12/22/2021	Wednesday	0000	2400	24 h 0 m	1440	292.85	421.71	685.4
RH4	12/23/2021	Thursday	0000	2400	24 h 0 m	1440	293.63	422.83	1,108.2
RH4	12/24/2021	Friday	0000	2400	24 h 0 m	1440	296.70	427.25	1,535.5
RH4	12/25/2021	Saturday	0000	2400	24 h 0 m	1440	287.27	413.6754	1,949.2
RH4	12/26/2021	Sunday	0000	2400	24 h 0 m	1440	286.55	412.6345	2,361.8
RH4	12/27/2021	Monday	0000	801	8 h01 m	481	305.75	147.0655	2,508.9

ZONE I1 - RED HILL - TOTAL 5 VOLUME TARGET FLUSH = 85.153 KGAL

Daily Flow Summary Red Hill Line Flush RH1 - RH164										
Date	DISCHARGE LOCATION / MANHOLE ID	POTABLE WATER TANK SUPPLY	Day	Start	Stop	Duration (hrs - min)	Duration (min)	Rate (gpm)	Volume (Kgal)	Cum Vol (Kgal)
12/27/2021	RH1	I1	Monday	8:31	8:57	0:26	26	236.92	6.16	6.16
12/27/2021	RH2	I1	Monday	9:44	10:17	0:33	33	182.12	6.01	12.17
12/27/2021	RH3	I1	Monday	10:39	11:09	0:30	30	212.67	6.38	18.55
12/27/2021	RH4	I1	Monday	12:27	12:54	0:27	27	252.04	6.81	25.36
12/27/2021	RH5	I1	Monday	11:28	12:05	0:37	37	293.38	10.86	36.21

2359500	2365660	6160
2366090	2372100	6010
2372400	2378780	6380
2390245	2397050	6805
2379065	2389920	10855

12/27/2021	RH6	I1	Monday	13:08	13:32	0:24	24	254.79	6.12	42.33	2397360	2403475	6115
12/27/2021	RH7	I1	Monday	13:59	14:32	0:33	33	231.97	7.66	49.98	2403580	2411235	7655
12/27/2021	RH8	I1	Monday	14:49	15:17	0:28	35	174.14	6.10	56.08	2411525	2417620	6095
12/27/2021	RH9	I1	Monday	15:27	17:58	2:31	151	40.10	6.06	62.13	2417815	2423870	6055
12/27/2021	RH10	I1	Monday	18:06	19:18	1:12	72	83.54	6.02	68.15	2423990	2430005	6015
12/27/2021	RH11	I1	Monday	9:38	10:43	1:05	65	92.54	6.02	74.16	4198585	4204600	6015
12/27/2021	RH12	I1	Monday	10:55	11:46	0:51	51	117.75	6.01	80.17	4204630	4210635	6005
12/27/2021	RH13	I1	Monday	11:56	12:42	0:46	50	118.50	5.93	86.09	4210670	4216595	5925
12/27/2021	RH14	I1	Monday	13:01	13:47	0:46	50	119.30	5.97	92.06	4216630	4222595	5965
12/27/2021	RH15	I1	Monday	14:05	14:57	0:52	52	116.25	6.05	98.10	4222650	4228695	6045
12/27/2021	RH16	I1	Monday	15:11	16:17	1:06	48	123.65	5.94	104.04	4228695	4234630	5935

CUM VOL:	**104.04**
TARGET VOL	**85.15**

Daily Flow Summary RH1 & RH4

Date	Day	RH1 Daily Total (Kgal)	RH4 Daily Total (Kgal)	Volume (Kgal)	Cum Vol (Kgal)	
12/20/2021	Monday	105.4	0	105.4	105.4	
12/21/2021	Tuesday	223.26	263.70	487.0	592.4	
12/22/2021	Wednesday	340.14	421.71	761.9	1,354.2	
12/23/2021	Thursday	339.05	422.83	761.9	2,116.1	
12/24/2021	Friday	331.00	427.25	758.3	2,874.3	
12/25/2021	Saturday	342.67	413.68	756.3	3,630.7	
12/26/2021	Sunday	343.43	412.63	756.1	4,386.8	Meet 4320 Kgal target at 2400 hrs Sun/0000hrs Mon.
12/27/2021	Monday	123.61	147.07	270.7	**4,657.4**	

CUM VOLUME: **4,657.4**
TARGET VOLUME: 4,100.0

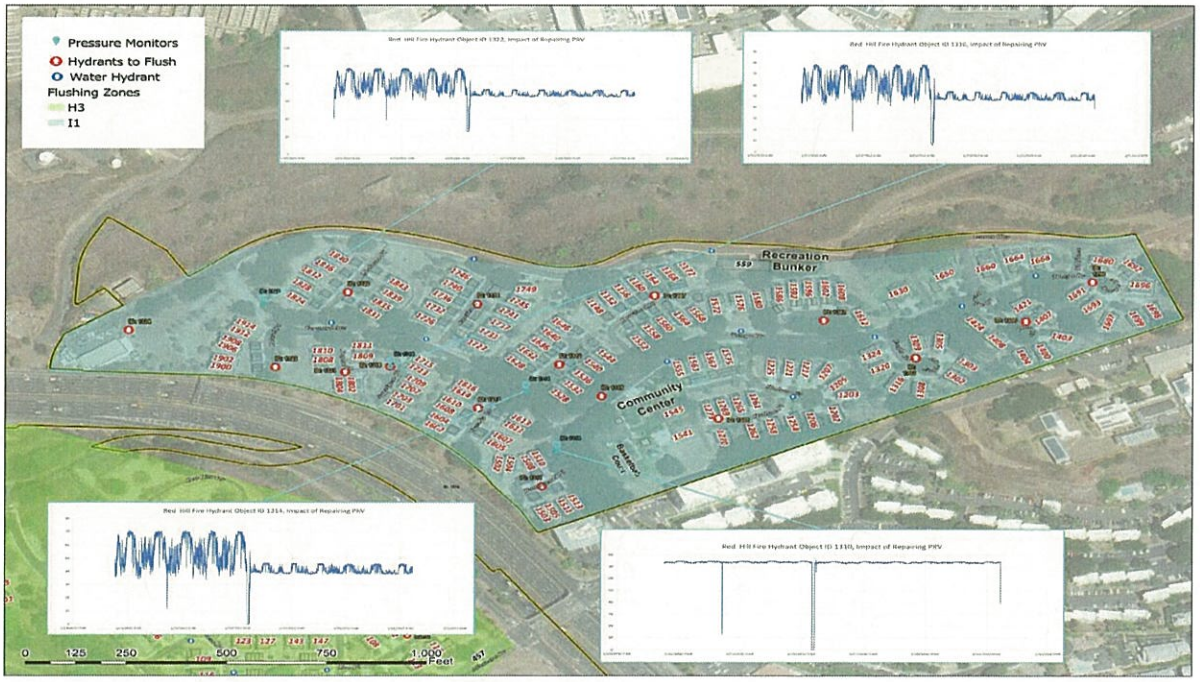
2a.5

2a.5 – Distribution System Pressure Log

A low pressure area (20-30 psi) in Red Hill Housing (Zone I1) was known prior to the flushing event. Pressure data loggers were used to document the locations and severity of the problem during December 2021 and January 2022 and field tests were performed to gain further insight. During all flushing operations service pressure and hydrant flow rate and residual pressure were primary concerns as all flushing operations had to stay below 200 gpm due to wet well and pump sizing. Since having residual and/or service pressures drop below 30 psi was not desirable, these conditions were closely monitored during operations. With the constraints (age, condition, ect.) of the system, a lower velocity method of flushing was necessary and as executed, proved to be effective at system-wide removal of aqueous phase fuel contaminants. Thus, flushing at 200 gpm utilizing 2 (two) hydrants proved effective. To be conservative, Zone I1 was flushed using the safety factor of five (5) volume exchanges of the distribution pipes vice three (3). Given the density and distribution of flushing hydrants and the additional volumes it is not believed the low pressure situation in Zone I1 impeded effective flushing operations.

However, industry standards (Uniformed Facilities Guide 3-230-02) requires service pressure be above 30 psi, the pressure regulator valve (PRV) repair had to be undertaken. The drop in pressure in Zone I1 observed on 25 January occurred when the PRV was repaired. Pressures stabilized considerably post repair and are now around 40 psi. Given the age of the system, service pressure is kept lower around the PRV to ensure the bottom of the PRV Zone is within tolerable limits, i.e., if pressures are too high a water main break may occur. The PRV repair has resolved the issue as indicted by the pressure data. The pressure drop indicated in the graph after the PRV replacement is not a pressure drop, but removal of the pressure data logger from the hydrant and a power down of the device.

FIGURE 1: WATER PRESSURE GRAPHS IN Zone I1 RED HILL HOUSING AREA AFTER THE PRESSURE REGULATOR VALVE REPAIR



2a.6 Level 2 Distribution Sampling Reports for Flushing Zone

Public Location: https://jbphh-safewaters.org/public/framework/bannerhtml.aspx?idhtml=10762&banner=zone_i1.png&title=Flushing%20Zone%20I1&idMenu=88918&ddlDSN=SYSTM&DSN=SYSTM

2b

Table 1: Lines of Evidence Under Evaluation – Ensure no contamination remains in the system and water chemistry concerns are addressed.

Objective 2b - Water in premise plumbing of homes/buildings meets State and Federal DW MCLs, specified State EALs, and ISPs.

Incident Specific Criteria –

- Flushing Plan includes procedures to ensure no service connections will re-contaminate the distribution system.
- Sample Plan includes 72-hour stagnation to account for leaching of contaminants from premise plumbing.
- Sample results show water in homes/buildings meets State and Federal DW MCLs, specified State EALs, and ISPs.

Lines of Evidence	Completion Status	Outstanding Items	Notes
Flushing Plan includes procedures to ensure no service connections will re-contaminate the distribution system.		Certification of adequate pressure within distribution system for Zone A1.	Maintain 30 psi within the distribution system during the building flushing operations.

2b.1

Flushing Zone I1
2022-01-11 - 2022-02-10

Total Facilities	Total Facilities Flushed	Percent Complete	No Access	Flushed on Selected Dates
3	3	100.0 %	0	3

Zone	Neighborhood	Address	Arrive Date	Start Time	End Time	Finish Time	Certified	Summary General Notes	Unable To Access	Access Reason
Flushing Zone I1		1217 Icarus Way; BLDG 1 - Warehouse	11-Jan-22	08:00	10:00	18:04	☑		☐	
Flushing Zone I1		1265 Ala Kula Pl; Red Hill Elementary	13-Jan-22	15:00	18:00	18:16	☑		☐	
Flushing Zone I1		1545 Tampa Dr; Splash Park Facility and	10-Feb-22	00:00	00:00	17:59	☑	Splash park completed 12JAN22.	☐	

Key
- Not Started
- No Access
- In Progress
- Complete

Flushing Zone I
2022-01-10 - Present

Total Homes	Total Homes Flushed	Percent Complete	No Access	Flushed on
146	135	92.5 %	0	135

Zone	Neighborhood	Address	Arrive Date	Start Time	Finish Time	Certified	Summary General Notes	Unable To Access	Access Reason
Flushing Zone I1		1148 Basswood Pl (I1-BASS1148)	12-Jan-22	13:00	10:41	☑		☐	
Flushing Zone I1		1152 Basswood Pl (I1-BASS1152)	12-Jan-22	16:00	10:39	☑		☐	
Flushing Zone I1		156 Basswood Place (I1-BASS1156)	13-Jan-22	15:00	11:25	☑		☐	
Flushing Zone I1		1160 Basswood Pl (I1-BASS1160)	12-Jan-22	13:00	10:43	☑		☐	
Flushing Zone I1		164 Basswood Pl (I1-BASS1164)	13-Jan-22	09:05	10:59	☑		☐	
Flushing Zone I1		1168 Basswood Pl (I1-BASS1168)	13-Jan-22	09:05	10:56	☑		☐	
Flushing Zone I1		1172 Basswood Pl (I1-BASS1172)	12-Jan-22	16:00	10:45	☑		☐	
Flushing Zone I1		1400 Bear Circle (I1-BEAR1400)	12-Jan-22	13:00	10:48	☑		☐	
Flushing Zone I1		1403 Bear Circle (I1-BEAR1403)	12-Jan-22	13:00	10:51	☑		☐	
Flushing Zone I1		1404 Bear Circle (I1-BEAR1404)	11-Jan-22	11:05	14:04	☑		☐	
Flushing Zone I1		1407 Bear Circle (I1-BEAR1407)	11-Jan-22	09:03	13:48	☑		☐	
Flushing Zone I1		1408 Bear Circle (I1-BEAR1408)	11-Jan-22	00:31	14:38	☑		☐	
Flushing Zone I1		1421 Bear Circle (I1-BEAR1421)	11-Jan-22	09:07	13:51	☑		☐	
Flushing Zone I1		1424 Bear Circle (I1-BEAR1424)	11-Jan-22	00:30	13:46	☑		☐	
Flushing Zone I1		1502 Buttonwood Place (I1-BUTT1502)	10-Jan-22	13:30	13:28	☑		☐	
Flushing Zone I1		1503 Buttonwood Pl (I1-BUTT1503)	10-Jan-22	15:44	13:31	☑		☐	
Flushing Zone I1		1504 Buttonwood Pl (I1-BUTT1504)	10-Jan-22	00:00	13:32	☑		☐	
Flushing Zone I1		1505 Buttonwood Pl (I1-BUTT1505)	10-Jan-22	10:00	14:44	☑		☐	
Flushing Zone I1		1508 Buttonwood Pl (I1-BUTT1508)	10-Jan-22	13:00	14:45	☑		☐	
Flushing Zone I1		1510 Buttonwood Pl (I1-BUTT1510)	12-Jan-22	17:00	10:53	☑		☐	
Flushing Zone I1		1511 Buttonwood Pl (I1-BUTT1511)	10-Jan-22	09:44	14:51	☑		☐	
Flushing Zone I1		1513 Buttonwood Pl (I1-BUTT1513)	13-Jan-22	09:15	11:08	☑		☐	
Flushing Zone I1		1726 Conifer Pl (I1-CONI1726)	12-Jan-22	14:00	11:00	☑		☐	
Flushing Zone I1		1727 Conifer Pl (I1-CONI1727)	12-Jan-22	13:00	11:02	☑		☐	
Flushing Zone I1		1731 Conifer Pl (I1-CONI1731)	10-Jan-22	14:00	13:17	☑		☐	
Flushing Zone I1		1732 Conifer Pl (I1-CONI1732)	12-Jan-22	14:10	12:07	☑		☐	
Flushing Zone I1		1736 Conifer Pl (I1-CONI1736)	11-Jan-22	00:00	14:21	☑		☐	
Flushing Zone I1		1737 Conifer Placeace (I1-CONI1737)	11-Jan-22	09:10	14:23	☑		☐	
Flushing Zone I1		1740 Conifer Place (I1-CONI1740)	12-Jan-22	15:00	11:03	☑		☐	
Flushing Zone I1		1741 Conifer Pl (I1-CONI1741)	12-Jan-22	16:00	11:05	☑		☐	
Flushing Zone I1		1745 Conifer Pl (I1-CONI1745)	13-Jan-22	11:16	10:59	☑		☐	
Flushing Zone I1		1746 Conifer Pl (I1-CONI1746)	11-Jan-22	00:10	13:29	☑		☐	
Flushing Zone I1		1749 Conifer Pl (I1-CONI1749)	11-Jan-22	08:52	13:25	☑		☐	
Flushing Zone I1		1602 Cowslip Ln (I1-COWS1602)	11-Jan-22	15:00	12:47	☑		☐	
Flushing Zone I1		1604 Cowslip Ln (I1-COWS1604)	11-Jan-22	12:56	12:44	☑		☐	
Flushing Zone I1		1605 Cowslip Ln (I1-COWS1605)	11-Jan-22	09:08	12:41	☑		☐	
Flushing Zone I1		1607 Cowslip Ln (I1-COWS1607)	11-Jan-22	14:28	12:36	☑		☐	
Flushing Zone I1		1608 Cowslip Ln (I1-COWS1608)	11-Jan-22	10:45	12:55	☑		☐	
Flushing Zone I1		1610 Cowslip Ln (I1-COWS1610)	13-Jan-22	09:08	10:46	☑		☐	
Flushing Zone I1		1611 Cowslip Lane (I1-COWS1611)	11-Jan-22	13:00	12:58	☑		☐	
Flushing Zone I1		1613 Cowslip Ln (I1-COWS1613)	12-Jan-22	00:30	13:16	☑		☐	
Flushing Zone I1		1614 Cowslip Lane (I1-COWS1614)	11-Jan-22	14:54	13:18	☑		☐	

Flushing Zone I1
2022-01-10 - Present

Flushing Zone I1	1616 Cowslip Ln (I1-COWS1616)	11-Jan-22	09:50	13:13	☑	☐
Flushing Zone I1	1628 Cowslip Lane (I1-COWS1628)	11-Jan-22	08:51	13:54	☑	☐
Flushing Zone I1	1632 Cowslip Lane (I1-COWS1632)	11-Jan-22	10:45	14:00	☑	☐
Flushing Zone I1	1636 Cowslip Ln (I1-COWS1636)	11-Jan-22	12:50	13:56	☑	☐
Flushing Zone I1	1640 Cowslip Ln (I1-COWS1640)	11-Jan-22	09:15	13:08	☑	☐
Flushing Zone I1	1646 Cowslip Ln (I1-COWS1646)	11-Jan-22	15:28	13:00	☑	☐
Flushing Zone I1	1302 Eagle Circle (I1-EAGL1302)	13-Jan-22	09:54	11:15	☑	☐
Flushing Zone I1	1303 Eagle Circle (I1-EAGL1303)	11-Jan-22	09:11	14:26	☑	☐
Flushing Zone I1	1305 Eagle Circle (I1-EAGL1305)	13-Jan-22	09:08	10:55	☑	☐
Flushing Zone I1	1308 Eagle Circle (I1-EAGL1308)	11-Jan-22	09:04	14:41	☑	☐
Flushing Zone I1	1309 Eagle Circle (I1-EAGL1309)	13-Jan-22	14:15	11:32	☑	☐
Flushing Zone I1	1316 Eagle Circle (I1-EAGL1316)	11-Jan-22	08:53	13:39	☑	☐
Flushing Zone I1	1320 Eagle Circle (I1-EAGL1320)	12-Jan-22	13:00	11:07	☑	☐
Flushing Zone I1	1324 Eagle Circle (I1-EAGL1324)	12-Jan-22	17:00	11:08	☑	☐
Flushing Zone I1	1202 Hudson Circle (I1-HUDS1202)	17-Jan-22	10:00	14:59	☑	☐
Flushing Zone I1	1203 Hudson Circle (I1-HUDS1203)	13-Jan-22	10:01	11:20	☑	☐
Flushing Zone I1	1205 Hudson Circle (I1-HUDS1205)	12-Jan-22	13:00	11:10	☑	☐
Flushing Zone I1	1206 Hudson Circle (I1-HUDS1206)	12-Jan-22	17:00	11:13	☑	☐
Flushing Zone I1	1207 Hudson Circle (I1-HUDS1207)	13-Jan-22	09:40	11:28	☑	☐
Flushing Zone I1	1217 Hudson Circle (I1-HUDS1217)	10-Jan-22	14:42	12:41	☑	☐
Flushing Zone I1	1221 Hudson Circle (I1-HUDS1221)	11-Feb-22	10:00	14:40	☑	☐
Flushing Zone I1	1225 Hudson Circle (I1-HUDS1225)	12-Jan-22	14:00	11:16	☑	☐
Flushing Zone I1	1254 Hudson Wy (I1-HUDS1254)	10-Jan-22	16:00	15:01	☑	☐
Flushing Zone I1	1258 Hudson Wy (I1-HUDS1258)	13-Jan-22	12:56	11:04	☑	☐
Flushing Zone I1	1261 Hudson Cir (I1-HUDS1261)	11-Jan-22	09:18	14:34	☑	☐
Flushing Zone I1	1262 Hudson Wy (I1-HUDS1262)	13-Jan-22	13:38	11:13	☑	☐
Flushing Zone I1	1265 Hudson Wy (I1-HUDS1265)	12-Jan-22	14:00	11:15	☑	☐
Flushing Zone I1	1269 Hudson Wy (I1-HUDS1269)	12-Jan-22	16:00	11:18	☑	☐
Flushing Zone I1	1270 Hudson Wy (I1-HUDS1270)	11-Jan-22	09:00	14:07	☑	☐
Flushing Zone I1	1273 Hudson Wy (I1-HUDS1273)	11-Jan-22	00:30	14:10	☑	☐
Flushing Zone I1	incorrect LOCID format (I1-1502BUTT)				☐	☐
Flushing Zone I1	1900 Laurel Pl (I1-LAUR1900)	10-Jan-22	10:00	14:57	☑	☐
Flushing Zone I1	1902 Laurel Pl (I1-LAUR1902)	13-Jan-22	09:10	11:02	☑	☐
Flushing Zone I1	1906 Laurel Placeace (I1-LAUR1906)	10-Jan-22	14:45	14:55	☑	☐
Flushing Zone I1	1908 Laurel Pl (I1-LAUR1908)	10-Jan-22	09:45	14:47	☑	☐
Flushing Zone I1	1912 Laurel Pl (I1-LAUR1912)	10-Jan-22	12:45	14:49	☑	☐
Flushing Zone I1	1914 Laurel Pl (I1-LAUR1914)	13-Jan-22	09:25	11:05	☑	☐
Flushing Zone I1	1824 Madrona Pl (I1-MADR1824)	21-Jan-22	08:00	18:51	☑	☐
Flushing Zone I1	1828 Madrona Pl (I1-MADR1828)	12-Jan-22	13:00	11:21	☑	☐
Flushing Zone I1	1831 Madrona Place (I1-MADR1831)	13-Jan-22	16:13	11:27	☑	☐
Flushing Zone I1	1832 Madrona Pl (I1-MADR1832)	12-Jan-22	16:00	11:22	☑	☐
Flushing Zone I1	1835 Madrona Pl (I1-MADR1835)	12-Jan-22	13:34	11:29	☑	☐
Flushing Zone I1	1836 Madrona Place (I1-MADR1836)	12-Jan-22	13:35	11:31	☑	☐
Flushing Zone I1	1839 Madrona Pl (I1-MADR1839)	10-Jan-22	08:00	14:57	☑	☐
Flushing Zone I1	1840 Madrona Pl (I1-MADR1840)	12-Jan-22	16:56	11:33	☑	☐
Flushing Zone I1	1843 Madrona Pl (I1-MADR1843)	12-Jan-22	16:31	11:37	☑	☐
Flushing Zone I1	NA (I1-04TH0127)				☐	☐

Flushing Zone I1

2022-01-10 - Present

Flushing Zone I1	NA (I1-3EDS0111)				☐	☐
Flushing Zone I1	NA (I1-COWS1028)				☐	☐
Flushing Zone I1	NA (I1-HOPS1202)				☐	☐
Flushing Zone I1	NA (I1-ICAR1217)				☐	☐
Flushing Zone I1	NA (I1-KAMA0422)				☐	☐
Flushing Zone I1	NA (I1-MONT0303)				☐	☐
Flushing Zone I1	NA (I1-OPUL0431)				☐	☐
Flushing Zone I1	NA (I1-PAPAP1809)				☐	☐
Flushing Zone I1	NA (I1-TAMP1545)				☐	☐
Flushing Zone I1	1802 Papaw Pl (I1-PAPA1802)	10-Jan-22	10:00	14:47	☑	☐
Flushing Zone I1	1804 Papaw Pl (I1-PAPA1804)	10-Jan-22	13:00	14:45	☑	☐
Flushing Zone I1	1808 Papaw Pl (I1-PAPA1808)	12-Jan-22	13:45	11:39	☑	☐
Flushing Zone I1	1809 Papaw Pl (I1-PAPA1809)	10-Jan-22	10:00	18:55	☑	☐
Flushing Zone I1	1810 Papaw Place (I1-PAPA1810)	12-Jan-22	16:35	11:41	☑	☐
Flushing Zone I1	1811 Papaw Pl (I1-PAPA1811)	12-Jan-22	18:10	11:35	☑	☐
Flushing Zone I1	1701 Sweetgum Pl (I1-SWEE1701)	11-Jan-22	09:40	14:12	☑	☐
Flushing Zone I1	1703 Sweetgum Pl (I1-SWEE1703)	10-Jan-22	22:00	18:56	☑	☐
Flushing Zone I1	1707 Sweetgum Pl (I1-SWEE1707)	10-Jan-22	08:00	14:48	☑	☐
Flushing Zone I1	1709 Sweetgum Pl (I1-SWEE1709)	12-Jan-22	13:52	11:47	☑	☐
Flushing Zone I1	1713 Sweetgum Pl (I1-SWEE1713)	10-Jan-22	10:00	18:57	☑	☐
Flushing Zone I1	1715 Sweetgum Pl (I1-SWEE1715)	12-Jan-22	13:55	11:49	☑	☐
Flushing Zone I1	1528 Tampa Dr (I1-TAMP1528)	13-Jan-22	11:40	11:19	☑	☐
Flushing Zone I1	1532 Tampa Dr (I1-TAMP1532)	13-Jan-22	12:31	11:08	☑	☐
Flushing Zone I1	1536 Tampa Dr (I1-TAMP1536)	10-Jan-22	10:45	12:44	☑	☐
Flushing Zone I1	1540 Tampa Dr (I1-TAMP1540)	10-Jan-22	14:45	12:46	☑	☐
Flushing Zone I1	1544 Tampa Dr (I1-TAMP1544)	10-Jan-22	09:52	13:15	☑	☐
Flushing Zone I1	1552 Tampa Dr (I1-TAMP1552)	13-Jan-22	09:18	11:11	☑	☐
Flushing Zone I1	1555 Tampa Dr (I1-TAMP1555)	12-Jan-22	15:13	11:47	☑	☐
Flushing Zone I1	1558 Tampa Driveive (I1-TAMP1558)	10-Jan-22	08:00	14:56	☑	☐
Flushing Zone I1	1560 Tampa Dr (I1-TAMP1560)	12-Jan-22	13:45	11:49	☑	☐
Flushing Zone I1	1561 Tampa Dr (I1-TAMP1561)	12-Jan-22	17:31	11:50	☑	☐
Flushing Zone I1	1564 Tampa Dr (I1-TAMP1564)	12-Jan-22	16:47	11:53	☑	☐
Flushing Zone I1	1567 Tampa Dr (I1-TAMP1567)	12-Jan-22	14:17	11:52	☑	☐
Flushing Zone I1	1568 Tampa Dr (I1-TAMP1568)	13-Jan-22	08:49	11:06	☑	☐
Flushing Zone I1	1572 Tampa Dr (I1-TAMP1572)	10-Jan-22	10:00	14:59	☑	☐
Flushing Zone I1	1575 Tampa Dr (I1-TAMP1575)	12-Jan-22	15:15	12:04	☑	☐
Flushing Zone I1	1576 Tampa Dr (I1-TAMP1576)	13-Jan-22	09:39	11:36	☑	☐
Flushing Zone I1	1580 Tampa Dr (I1-TAMP1580)	10-Jan-22	08:00	14:54	☑	☐
Flushing Zone I1	1586 Tampa Dr (I1-TAMP1586)	12-Jan-22	15:20	11:54	☑	☐
Flushing Zone I1	1592 Tampa Dr (I1-TAMP1592)	12-Jan-22	17:58	12:00	☑	☐
Flushing Zone I1	1596 Tampa Dr (I1-TAMP1596)	12-Jan-22	14:02	12:00	☑	☐
Flushing Zone I1	1602 Tampa Dr (I1-TAMP1602)	12-Jan-22	14:54	12:02	☑	☐
Flushing Zone I1	1608 Tampa Dr (I1-TAMP1608)	12-Jan-22	14:11	12:05	☑	☐ Water on the fridge doesn't work but still changed the filter.
Flushing Zone I1	1612 Tampa Dr (I1-TAMP1612)	10-Jan-22	10:06	13:56	☑	☐
Flushing Zone I1	1630 Tampa Dr (I1-TAMP1630)	10-Jan-22	13:50	13:50	☑	☐
Flushing Zone I1	1650 Tampa Drive (I1-TAMP1650)	13-Jan-22	10:34	10:57	☑	☐

Flushing Zone I1

2022-01-10 - Present

Flushing Zone I1	1660 Tampa Dr (I1-TAMP1660)	11-Jan-22	14:00	14:15	☑	☐
Flushing Zone I1	1664 Tampa Dr (I1-TAMP1664)	13-Jan-22	09:32	11:42	☑	☐
Flushing Zone I1	1668 Tampa Dr (I1-TAMP1668)	13-Jan-22	09:00	10:41	☑	☐
Flushing Zone I1	1680 Tampa Dr (I1-TAMP1680)	13-Jan-22	13:42	10:45	☑	☐
Flushing Zone I1	1691 Tampa Dr (I1-TAMP1691)	12-Jan-22	14:23	12:05	☑	☐
Flushing Zone I1	1692 Tampa Dr (I1-TAMP1692)	10-Jan-22	01:05	16:53	☑	☐
Flushing Zone I1	1693 Tampa Dr (I1-TAMP1693)	12-Jan-22	15:45	12:09	☑	☐
Flushing Zone I1	1696 Tampa Dr (I1-TAMP1696)	10-Jan-22	10:11	13:36	☑	☐
Flushing Zone I1	1697 Tampa Dr (I1-TAMP1697)	10-Jan-22	14:00	14:53	☑	☐
Flushing Zone I1	1698 Tampa Dr (I1-TAMP1698)	12-Jan-22	14:15	12:08	☑	☐
Flushing Zone I1	1699 Tampa Dr (I1-TAMP1699)	13-Jan-22	09:20	10:50	☑	☐

Key

- Not Started
- No Access
- In Progress
- Complete

2b.2

2b.2 Level 2 Residential Sampling Report for Flushing Zone

Public Location: https://jbphh-safewaters.org/public/framework/bannerhtml.aspx?idhtml=10762&banner=zone_i1.png&title=Flushing%20Zone %20I1&idMenu=88918&ddlDSN=SYSTM&DSN=SYSTM

2b.3 Level 4 Residential Sampling Report for Flushing Zone

Public Location: https://jbphh-safewaters.org/public/framework/bannerhtml.aspx?idhtml=10762&banner=zone_i1.png&title=Flushing%20Zone %20I1&idMenu=88918&ddlDSN=SYSTM&DSN=SYSTM

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
DIRECTORATE OF PUBLIC WORKS
947 WRIGHT AVENUE, WHEELER ARMY AIRFIELD
SCHOFIELD BARRACKS, HAWAII 96857-5013

AMIM-HWP

10 February 2022

MEMORANDUM FOR Interagency Drinking Water System Team (IDSWT) Building C27, Nanumea Road, Naval Station Pearl Harbor, Joint Base Pearl Harbor-Hickam, Hawaii 96818

SUBJECT: Army Flushing of Irrigation System in Red Hill Housing, Zone I1

1. OBJECTIVE. This addendum provides additional technical information to document the irrigation flushing methodology and engineering approach used to restore Flushing Zone I1 (Red Hill Housing area). This memorandum serves as the certification that the irrigation flushing was conducted in accordance with Department of Health (DOH) Hawaii guidance.

2. BACKGROUND.

2.1. The DOH-Hawaii provided guidance on 8 February 2022 to the IDSWT for active irrigation and line purging. Guidance provided includes:

- Determine what the irrigation system pipe size is (for volume calculations).
- Calculate the approximate amount of time needed to complete 3 volumetric turnovers of the subject line (est. duration per foot).
- Assess how long each line will need to be purged/flushed based on the above estimates.
- Notify community.
- Cover or otherwise minimize any spray from the system (traffic cone) in order to prevent
- Contact.
- Purge irrigation system under supervision for the estimated duration.
- Allow ground to absorb and dry.
- Notify residents to avoid area for the next 24 hours.
- Prevent/minimize any runoff.
- Prevent contact with the irrigation water.

2.2. In accordance with DOH guidance, the Army developed a Standard Operating Proceure (SOP) with a check-list that follows the guidance provided by DOH-Hawaii. Training was provided in accordance with SOP prior to flushing. See enclosure 1 (Irrigation Line Flushing Plan).

3. Engineering Analysis and Tools. US Army Garrison-Hawaii (USAG-HI) utilized engineering judgement informed by existing tools and data sources to determine the Volume of irrigation line required to be flushed.

3.1. Review of Zone I1 irrigation system drawings indicated that the system consists of primarily a drip irrigation system connected to a perimeter sprinkler irrigation system.

4. FLUSHING OPERATIONS.

4.1. Date. Flushing started on 10 February 2022 and was completed the same day.

4.2. Housing partners Island Palm Community (IPC) provided the staff to conduct the flushing operations. The Army provided government oversight to ensure documentation of the flushing operations was conducted in accordance with the Irrigation Line Flushing plan.

4.3. Flushing check-list have been completed for each residence and hard copy files will be retained.

4.4. Flushing was conducted in accordance with DOH-Hawaii guidance.

5.0. Point of Contact. For additional information, please contact Mr. Tony Gainey, USAG-HI DPW Director, at (808) 787-6128.

1 Encls
1. Irrigation Line Flushing Plan

MISIGOY.DANIEL.1185958422
Digitally signed by MISIGOY.DANIEL.1185958422
Date: 2022.02.10 17:11:38 -10'00'

Daniel Misigoy
Colonel, U.S. Army

Daniel Misigoy
COL, LG
Commanding

Irrigation Line Flushing Plan

AMR, O'ahu, Hawai'i

February 2022

FLUSHING CHECKLIST: IRRIGATION LINES

ADDRESS: _____

This checklist is to be used by Army personnel to include Government Housing Partners and Contractors for flushing irrigation lines that may have water contaminated with petroleum chemicals. Irrigation lines shall be flushed only **AFTER** the water distribution system has been flushed. Signed checklist will be added to the home management record.

All irrigation line flushing teams will adhere to current CDC, State of Hawaii, and Army COVID-19 safety protocols.

ATTENTION

- PREVENT CONTACT WITH HUMANS, PETS AND WILDLIFE
- COVER SPRAY HEADS (BUCKETS, CONES, ETC) TO MINIMIZE SPRAY
- DO NOT LEAVE IRRIGATION LINES UNATTENDED.
- DOCUMENT ANYTHING UNUSUAL ENCOUNTERED BEFORE OR DURING FLUSH.
- IF STRONG FUEL SMELL IS PRESENT WHEN FLUSHING, STOP FLUSHING
- DO NOT LET WATER RUNOFF INTO STREETS/STORM DRAINS. ENSURE WATER DISCHARGES TO GROUND AND IS ABSORBED.
- ENSURE FLUSHING IS SUPERVISED AT ALL TIMES

☐ STEP 1: NOTIFY RESIDENTS. PREPARE FOR IRRIGATION LINE FLUSHING

☐ STEP 2: IDENTIFY ALL SPRAY HEADS IN LINE, COVER HEADS WITH BUCKETS, CONES, ETC TO MINIMIZE SPRAY

☐ STEP 3: ENSURE NO PERSONS ARE NEAR THE SITE, PREVENT CONTACT WITH HUMANS, PETS, WILDLIFE

☐ STEP 4: PURGE IRRIGATION SYSTEM FOR SPECIFIED AMOUNT OF TIME.

☐ STEP 5: PLACE WARNING SIGNS NOTIFYING RESIDENTS TO AVOID AREA FOR 24 HOURS AFTER FLUSH.

☐ STEP 6: CLEAN UP**

*See Appendix A for Standard Operating Procedures of Steps 1-6.

**See Appendix B for Home Drop Card

Confirmation of Flushing for Irrigation Systems

_____ Name of Technician

_____ Organization

_____ Signature

_____ Date

APPENDIX A: FLUSHING STANDARD OPERATING PROCEDURES: Irrigation Systems

Team Supplies Needed

- Cones, buckets or other device to cover spray heads
- Nitrile or Latex gloves
- Warning Signs

ATTENTION

- PREVENT CONTACT WITH HUMANS, PETS AND WILDLIFE
- COVER SPRAY HEADS (BUCKETS, CONES, ETC) TO MINIMIZE SPRAY
- DO NOT LEAVE IRRIGATION LINES UNATTENDED.
- DOCUMENT ANYTHING UNUSUAL ENCOUNTERED BEFORE OR DURING FLUSH.
- IF STRONG FUEL SMELL IS PRESENT WHEN FLUSHING, STOP FLUSHING
- DO NOT LET WATER RUNOFF INTO STREETS/STORM DRAINS. ENSURE WATER DISCHARGES TO GROUND AND IS ABSORBED.
- ENSURE FLUSHING IS SUPERVISED AT ALL TIMES

STEP 1. NOTIFY RESIDENTS. PREPARE FOR IRRIGATION LINE FLUSHING

☐ Confirm that resident notification is complete.

☐ Determine irrigation system pipe size

☐ Calculate the approximate amount of time needed to complete 3 volumetric turnovers. If unknown, run for 30 minutes or 2 minutes per spray head, whichever is longer

☐ For drip irrigation lines, flush for 15 minutes.

☐ Assess how long each line will need to be purged/flushed based on the above calculation

STEP 2: IDENTIFY ALL SPRAY HEADS IN LINE, COVER HEADS WITH BUCKETS, CONES, ETC TO MINIMIZE SPRAY

☐ Confirm the number of spray heads based on site drawings or IPC knowledge of home configuration.

☐ Cover all spray heads with a traffic cone or bucket

☐ To the maximum extent ensure the largest portion of the bucket or cone is over grass

☐ For drip irrigation lines, remove the flush cap or crimp at the end of the line, ensure the line discharges to soil or grass

STEP 3. ENSURE NO PERSONS ARE NEAR THE SITE, PREVENT CONTACT WITH HUMANS, PETS, WILDLIFE

☐ Verify that no people are outside the home.

☐ Confirm that no pets or other animals are outside the home.

☐ If pets are outside the home and cannot be relocated by the resident. Note the address and move to the next location.

ATTENTION

- PREVENT CONTACT WITH HUMANS, PETS AND WILDLIFE
- COVER SPRAY HEADS (BUCKETS, CONES, ETC) TO MINIMIZE SPRAY
- DO NOT LEAVE IRRIGATION LINES UNATTENDED.
- DOCUMENT ANYTHING UNUSUAL ENCOUNTERED BEFORE OR DURING FLUSH.
- IF STRONG FUEL SMELL IS PRESENT WHEN FLUSHING, STOP FLUSHING
- DO NOT LET WATER RUNOFF INTO STREETS/STORM DRAINS. ENSURE WATER DISCHARGES TO GROUND AND IS ABSORBED.
- ENSURE FLUSHING IS SUPERVISED AT ALL TIMES

STEP 4. PURGE IRRIGATION SYSTEM FOR SPECIFIED AMOUNT OF TIME.

☐ Turn on the irrigation system and run for 30 minutes or 2 minutes per spray head, whichever is longer.

☐ Turn on the drip irrigation system and run for 15 minutes.

☐ Discontinue flushing if irrigation water runs off of / along the pavement and toward or into a storm drain.

☐ Following the flush, shut off the irrigation system and return the system to its normal configuration.

STEP 5. PLACE WARNING SIGNS NOTIFYING RESIDENTS TO AVOID AREA FOR 24 HOURS AFTER FLUSH.

☐ Place warning signs at either end or the irrigation line along pathways that residents are likely to use to approach (i.e. sidewalks, driveways, etc.)

ATTENTION

- PREVENT CONTACT WITH HUMANS, PETS AND WILDLIFE
- COVER SPRAY HEADS (BUCKETS, CONES, ETC) TO MINIMIZE SPRAY
- DO NOT LEAVE IRRIGATION LINES UNATTENDED.
- DOCUMENT ANYTHING UNUSUAL ENCOUNTERED BEFORE OR DURING FLUSH.
- IF STRONG FUEL SMELL IS PRESENT WHEN FLUSHING, STOP FLUSHING
- DO NOT LET WATER RUNOFF INTO STREETS/STORM DRAINS. ENSURE WATER DISCHARGES TO GROUND AND IS ABSORBED.

STEP 6. CLEAN UP**

☐ Return the irrigation system to its previous configuration.

☐ Ensure drip irrigation is capped / crimped as it was previously.
☐ Verify that water is not absorbed into surrounding soil and not running into storm drains.
☐ Confirm removal of buckets/cones from the irrigation system.
☐ Do one last walkthrough to ensure all water is secured, trash is removed.
☐ Place the DROP CARD at the front door of the residence.

NOTES TO IDENTIFY DISCREPCIENCES OR MAINTANENCE ISSUES

1.

2.

3.

From: Riley, Jonathan (Oz) CIV USARMY USARPAC (USA) <jonathan.riley2.civ@army.mil>
Sent: Wednesday, February 9, 2022 20:08
To: Sanchez, Yolanda; Yoshishige, Jon I CIV USN (USA); Arita-Chang, Kaitlin
Cc: Hughes, Sean A CIV USN COMNAVREG NW BGR WA (USA); Diaz, Alejandro; Bakic, Luka LTJG USN NPASE WEST SAN CA (USA); Army Public Affairs LNOs; Phillips, Robert William (Rob) COL USARMY USARPAC (USA); Holland, Julianne J LCDR USN NPASE WEST SAN CA (USA); Doss, Clayton Bradley III CAPT USN ASSTSECNAV RDA DC (USA)
Subject: [EXTERNAL] NOTIFICATION: Announcement of Irrigation System Flushing for Red Hill Neighborhood (Zone I1)

JIC and Interagency Teammates,

***RESENDING WITH CORRECT SUBJECT LINE. No change to text below ***

IAW latest guidance, TF Ohana will begin flushing irrigation systems in Red Hill Neighborhood tomorrow (Thursday) morning @0900.

FYSA, below is the text of the announcement they will send to residents this evening via text message and email and post on their social media.

If you have any questions or concerns, please let me know. Take care and have a great evening.
V/R,
-Oz

JONATHAN RILEY, APR
Deputy Director of Public Affairs
U.S. Army Pacific
Bldg 600C (C2F), Room N3204
PAO Phone: (808) 786-0300 [DSN 315-436-0300]
Direct: (808) 786-0391 [DSN: 315-436-0391]
Mobile: (808) 800-1412
PAO E-Mail: usarmy.shafter.usarpac.mbx.pao@mail.mil
NIPR: jonathan.riley2.civ@army.mil
SIPR: jonathan.riley2@mail.smil.mil

Aloha Red Hill Residents,

On behalf of Task Force Ohana, please see an important message below regarding the irrigation system flush that will take place in your housing area Thursday and Friday, Feb. 10th and 11th.

Island Palm Communities personnel will flush the irrigation lines in your front yard flower beds and the common area associated with the Red Hill Community Center. This common area starts at the entrance of Red Hill and extends on both sides of Forward Avenue up to and surrounding

the Red Hill Community center. The common area does not extend beyond Tampa Drive. We will begin tomorrow at 9a.m.

The flushing will take between 15-30 minutes per location, and once complete, technicians will post an information card to the front door of each home.

Out of an abundance of caution, and in accordance with Hawaii Department of Health guidance, please avoid all irrigated areas for 24 hours after the flush is complete. IPC will mark the common area surrounding the Red Hill Community Center once the irrigation flush is complete.