GUAM WATERWORKS AUTHORITY	STANDARD OPERATING PROCEDURE	No.	SOP-1500-WWC-001
	Hydro Flushing	Effective Date	3/19/2025
		Final Approver	Miguel C. Bordallo, P.E. General Manager
		Revision Letter	A

1.0 Purpose

This Standard Operating Procedure (SOP) establishes cleaning procedures for the sanitary sewer system using a High-Velocity Jetter truck or Combination truck, a practice commonly known as Hydro Flushing.

Hydro Flushing is a fast and reliable method for unclogging sewers and restoring normal flow. It has become the preferred methodology for sewer cleaning and is low-impact on valuable assets.

2.0 Scope

This SOP covers the application of the High-Velocity Jetter, including cleaning methods, equipment usage, and hazards associated with flushing operations. It applies to Wastewater Collections personnel carrying out hydro flushing operations on sewer lines.

3.0 Policy

GWA will establish routine maintenance and preventive cleaning measures to ensure optimal performance of the sanitary sewer system (collection system), prevent blockages, and promote efficient wastewater flow.

4.0 Definitions

4.1. **Cleaning Head Tool:** Refers to the nozzle at the end of the high-pressure water hose that is configured in different variations to clean and flush sanitary sewers.

4.2. **Closed Circuit Televising (CCTV):** The use of a video camera to inspect sewer lines for structural integrity and pipe conditions such as damages or obstruction.

4.3. **Combination Sewer Cleaning Truck (Combination Truck):** A sewer cleaning machine capable of flushing and vacuuming debris.

4.4. **Court Order Unit (COU):** Personnel in GWA's wastewater collection division who monitor, maintain, inspect (via CCTV), and clean sewer lines to ensure regulatory compliance and efficient operation.

4.5. **Geographic Information System (GIS):** A mapping system that collects, manages, and analyzes spatial data using location-based information. It is a computer system used to create maps and visual representations for capturing, storing, checking, and displaying data related to positions on the Earth's surface.

4.6. **High Velocity Jetter:** A machine designed to remove grease, roots, and debris from wastewater collection sewer lines and clean them with high-velocity jets of water. Also referred to as a jetter, hydraulic cleaner, hydro jet, flusher, and jet truck[1].

[1] high-velocity cleaner (HVC) (csus.edu).

4.7. **Jet Rodding:** An industry standard term for hydro flushing, referring to a specific manufacturer of hydro flushing equipment.

4.8. **National Association of Sewer Service Companies (NASSCO):** A not-for-profit trade organization that provides quality education and training on pipeline condition assessment and inspection.

4.9. **Operators:** Personnel from GWA's Court Order Unit who conduct sewer line cleaning and perform CCTV inspections.

4.10. **Pipeline Assessment Certification Program (PACP):** A standardized system developed by NASSCO for coding sewer pipe inspection footage.

4.11. **Sanitary Sewer Overflow (SSO):** Any overflow, spill, release, or diversion of wastewater from a sanitary sewer collection system that occurs before a treatment plant. Sanitary sewer overflows include a) overflows or releases of wastewater that reach waters of the US, b) overflows or releases of wastewater that do not reach waters of the US, and c) wastewater backups into buildings or private property that are caused by blockages or flow conditions in a sanitary sewer system or building sewer lateral. SSOs are generally caused by high volumes of Inflow and Infiltration (I/I) pipe blockages, pipe breaks, power failure, and insufficient system capacity.

4.12. **Sanitary Sewers:** A sewer that carries sewage and to which storm, surface, and ground waters are not intentionally admitted.

4.13. **Sewer Manhole (SMH):** The surface-level access point for a below-ground sewer piping system. Designed for the entry of cleaning equipment and personnel to conduct sewer maintenance on underground sewer piping.

4.14. **Tiger Tail:** The protective sleeve that guards the high-pressure water hose from damage caused by rubbing against the rims of manholes or other entry points.

4.15. **Water Wastewater System Control Center (SCC):** GWA's primary control/communications hub connecting field personnel and system operators with Operations Supervisors or Managers and executive management. SCC Dispatchers send and receive data to and from field personnel/operators providing critical asset information, additional support, or equipment needed. SCC is also responsible for documenting all transactions between SCC, the relevant Operations Supervisor or Manager, and the responding field personnel/operators.

5.0 Roles & Responsibilities

5.1.	General Manager (GM)	Approves this SOP and all its subsequent changes. Reviews monthly reports submitted by the Manager.
5.2.	Assistant General Manager for Operations (AGM-O)	Oversees the development, revision, and implementation of this SOP as the Policy Owner. Reviews monthly reports submitted by the Manager.

5.3.	Operations & Maintenance (O&M) Manager, Wastewater Collection (WWC)	Reviews this SOP annually and makes necessary changes to be presented to the AGM-O for consideration. Ensures that proper training and/or training guidelines are provided to the affected employees to ensure proper compliance with this SOP. Reviews and submits monthly reports to the AGM-O and GM.
5.4.	Pump Station (PS) Supervisor	Monitors personnel to ensure compliance with this SOP and provide guidance if needed. Gathers sewer system information and mapping using the GIS to locate sewer manholes and sewer main lines. Notifies the Trouble Dispatch Center forty-eight (48) hours in advance of a planned road closure and ensures the required permits are obtained. Notifies SCC to request assistance from the CCTV inspection team when damages or defects are discovered. Once a damage or defect is confirmed, sends the marked location, video footage, GIS map location and PACP report to the Maintenance Supervisor for repair. Submits a report to the O&M Manager at the end of every month. Submits a report to Compliance and Safety Division at the end of every quarter.
5.5.	Trouble Dispatch Center (Dispatch)	Prepares water outage/road closure alert via Mailchimp and text message based on the information provided by the O&M Manager or Supervisor.
5.6.	Control Dispatchers, SCC	Receive critical reports or information from GWA field personnel regarding GWA operations. Relays the report or information received and ensures all communications are updated and in the SCC records for its reference.
5.7.	Operators	Strictly abide by the contents of this SOP and conduct activities accordingly. When confronted by a situation not covered by this SOP or requiring clarification, seek the manager's or supervisor's assistance.

6.0 Procedure Description

6.1. **General Preparation**

6.1.1. **Data Collection.** The Pump Station (PS) Supervisor collects sewer system information and maps using the Geographic Information System (GIS) to locate uninspected sewer manholes (SMH) and sewer main lines (SML).

6.1.2. **Cleaning Schedule.** The GIS data collected may be used to determine the daily and weekly cleaning schedules for the Hydro Flushing (HF) team.

6.1.3. **Hydro Flushing Equipment and Supplies.** The COU must ensure that all equipment is fully functional and that adequate supplies are available. See *Equipment and Supply Inventory List* **(Attachment 1)**.

6.1.4. **Road Closures.** If a road closure is required, the PS Supervisor must notify the Trouble Dispatch Center (Dispatch) via email or text message to request a road closure notice using the Water Outage & Road Closure Notice Request forty-eight (48) hours before the planned closure[2].

6.2. **Hydro Flushing Team:** A minimum of two (2) operators from the Court Order Unit (COU) are required to perform hydro-flushing activities.

6.2.1. One operator will operate the High-Velocity Jetter (Jetter) or vacuum on the Combination truck, while the other handles traffic control and assists with operations.

6.3. **Pre-Departure Procedures:**

6.3.1. **Notification.** Operators are required to notify SCC of their daily work assignments and locations.

6.3.2. **Pre-Departure Checklist.** Operators shall conduct a pre-departure inspection of their assigned GWA heavy equipment using the *Pre-Departure Checklist* to ensure that it is fully functional and ready for use. See *Heavy Equipment Pre-Departure Checklist* **(Attachment 2)**.

6.4. **Hydro Flushing Preparation and Set-Up.**

6.4.1. Upon arrival at the site, park the Jetter or Combination truck at the closest access point (SMH or cleanout). Activate the beacon light and engage the parking brake.

6.4.2. Place chock blocks on each required tire. Engage the power take-off (PTO).

6.4.3. Establish traffic control measures and set up visible street signs to ensure a safe working area.

6.4.4. Open the access point (SMH, cleanout, etc.). When opening the SMH, be sure to use proper lifting techniques.

[2] SOP-1500-WP-001, *Water Outage and Road Closure Notifications to the Media/Public*.

6.4.5. Extend the hose reel out to its working position.

6.4.6. Release the hose reel swivel lock and swivel the hose reel to a position that allows the straightest line for the hose to travel from the reel to the sewer line. Engage the swivel lock once in position.

6.4.7. Using the hose reel control lever, extend the hose out enough to place the nozzle into the SML to be flushed.

6.4.8. Attach the nozzle extender and appropriate cleaning nozzle to the Jetter hose, ensuring that the attachments are secure.

6.4.9. Place the cleaning nozzle at the bottom of the sewer line.

6.4.10. Face the cleaning nozzle toward the upstream SMH. Confirm the direction of the nozzle before turning on the Jetter or Combination truck.

6.4.11. Place the tiger tail between any surface that comes into contact with the hose.

6.4.12. Turn on the throttle switch at the hose reel control panel.

6.4.13. Turn the lever to a vertical position to open the water valve.

6.4.14. Turn on the Jetter by flipping the toggle switch upwards.

6.4.15. Gradually increase the pressure using the throttle-up switch.

6.4.16. Minimize the water pressure to the minimum value that will propel the cleaning head and hose up the sewer line.

6.4.17. When the cleaning nozzle reaches the upstream SMH, end of the pipe, or pipe section to be cleaned, the second operator will confirm that it has reached the upstream SMH. This can be done by physically opening the upstream SMH or by comparing the footage counter to the annotated line length.

6.4.18. Insert a debris basket (strainer or catcher) into the invert in the downstream direction of the sewer line in the SMH channel. This allows wastewater to flow through with minimal interruption while catching debris brought back from jetting for removal through the SMH access point.

6.4.19. Begin hose return and cleaning procedures.

6.5. **Hydro Flushing Procedures**

6.5.1. Start by increasing the water pressure to the desired level. Monitor pressure based on line depth and grade. Be sure to use minimal pressure to move the nozzle effectively.

6.5.2. Slowly retrieve the cleaning hose from the upstream SMH back down the sewer line controlling the retrieval speed to ensure proper winding on the hose reel.

6.5.3. Retrieve the cleaning hose in ten (10) feet (ft) increments while monitoring the flow at the bottom of the SMH for debris.

6.5.4. Observe the spray from the cleaning nozzle for any debris being carried back while cleaning.

6.5.5. When no more debris is noticed and the flow in the bottom of the SMH becomes clearer, slowly retrieve the hose another 10 ft continuing to observe the bottom of the SMH for debris.

6.5.6. Repeat the above steps until the leader hose is visible at the bottom of the SMH.

6.5.7. When the nozzle is approximately 10 ft from the SMH, decrease the throttle, flip the jetter toggle switch to the down (off) position, and close the water valve by turning the lever to the horizontal position.

6.5.8. Retrieve the cleaning hose until the nozzle is visible at the access point and continue this process until it reaches the hose reel.

6.5.9. Remove the nozzle from the cleaning hose and secure it in its proper storage.

6.5.10. Swivel the hose reel back into its starting position, engage the swivel lock, and retract it back in place.

6.6. **CCTV Inspection.** CCTV inspection may be required to further inspect the cleanliness, infiltration, or damage if flushing does not adequately clear lines or repeated flushing is required[3]. During this process, the sewer line's condition will be evaluated and recorded as part of the cleaning records. The assessment will determine if the sewer line has any structural issues such as sags, offsets, or breaks or if there are any root intrusions or illegal connections present.

6.7. **Post Flushing Procedures**

6.7.1. Disengage the PTO.

6.7.2. Disinfect/sanitize attachments, portable equipment, tools, and other necessary materials with a disinfecting agent (e.g., Dawn dishwashing liquid or Simple Green) and then load them onto the Jetter or Combination truck.

6.7.3. Remove safety cones, signs, and other safety equipment from the roadway and load them securely onto the vehicle.

6.7.4. Empty the excess waste in the Combination truck.

6.7.5. Transport the excess waste to the designated disposal sites (e.g., excess liquid may be dumped into the designated SMH and excess solids into the designated drying bed).

[3] Refer to the *CCTV Sewer Line Inspection* SOP.

6.7.6. Upon disposal of excess waste, flush out any excess debris that may line the inside of the Combination truck.

6.7.7. Park the Jetter or Combination truck at its assigned parking at the station. Ensure the truck is properly secured. Release excess hydraulic air, place air brakes in the "lock" position, and place chock blocks on each required tire.

6.8. **Determine the Root Cause.** Following a CCTV inspection and evaluating the materials removed during the cleaning process, the operator can identify the root cause of any SSO or related issues. Several factors are considered in this evaluation, which may include a combination of contributing causes.

6.8.1. If a large amount of fats, oil and grease (FOG) is observed during cleaning and the SML is in good condition, FOG is likely the root cause.

6.8.2. If the debris consists of rocks and rags, it could indicate a break or poor condition in the SML. The operator will evaluate the amount of debris to determine whether the issue is a break or poor condition of the SML.

6.8.3. If an SSO occurs during wet weather and the SML is in poor condition, the root cause is likely Inflow and Infiltration (I/I). This can be confirmed by frequent surcharging without debris plugging the line, indicating a capacity issue.

6.9. **Reporting**

6.9.1. **Damage Reporting.** When the Operator discovers damage(s) to the SML or SMH, the following actions must be taken:

6.9.1.1. Immediately notify the PS Supervisor of the potential damage or defect.

6.9.1.2. The PS Supervisor will notify SCC via email or text message to request assistance from the CCTV inspection team to conduct a sewer line inspection to confirm the damage or defect.

6.9.1.3. After confirming the damage or defect, the PS Supervisor will mark the affected area and send the location, video footage, GIS map location, and PACP report, to the Maintenance Supervisor[4].

6.9.2. **Monthly Reporting.** At the end of each month, the PS Supervisor submits a detailed report to the Operations and Maintenance (O&M) Manager, providing a list of SMLs that have been cleaned together with a copy of the GIS map locations. The O&M Manager reviews the report for accuracy and submits it to the Assistant General Manager for Operations (AGM-O) and General Manager (GM) for final review.

6.9.3. **Quarterly Reporting.** At the end of each quarter, the PS Supervisor submits a detailed report of the sewer graphs to the Compliance and Safety (C&S) division to include in their divisional report to the United States Environmental Protection Agency (USEPA).

[4] Refer to the *CCTV Sewer Line Inspection* SOP.

6.10. **Training:** The O&M Manager should conduct training on hydro flushing when needed. All new or applicable employees must receive training and sign the *Employee's Acknowledgment Receipt* **(Attachment 3)** to confirm their understanding and compliance with the procedures outlined in this SOP.

6.11. **Non-Compliance to this SOP:**

6.11.1. **Employee:** Failure of the employee to adhere and comply with any of the guidelines, policies, and procedures stated herein may result in progressive or adverse disciplinary action, including but not limited to suspension, demotion or termination of employment as provided by GWA Personnel Rules and Regulations (PR&R).

6.11.2. **Supervisors and Managers:** Failure of the Manager or Supervisor to report and enforce all the guidelines, policies, and procedures stated herein may result in progressive or adverse disciplinary action, including but not limited to suspension, demotion, or termination of employment as provided by GWA PR&R.

7.0 Document Approvals

Role	Position	Name of Approver	Approval Signature	Date Approved
Authors	Pump Station Supervisor Legal Secretary III	Frank Sablan Antonette Dione Gutierrez	Approval on File	On File
Policy Owner	Assistant General Manager – Operations (AGM-O)	Thomas A. Cruz, P.E.	Approval on File	On File
Final Approver	General Manager	Miguel C. Bordallo, P.E.	Page 1	Page 1

By existing Guam and Federal laws, the contents of this SOP were reviewed thoroughly by its Policy Owner and were found to be:

☒ appropriate for publication on the GWA website without compromising the security of GWA's system or the public's health and safety.

☐ not appropriate for publication on the GWA website because it might jeopardize the security of GWA's system or the public's health and safety

8.0 Records of Revisions

All suggestions for improvement shall be directed to the Policy Owner indicated below. The Policy Owner will consider the input received, develop recommendations on how to address the suggestions, and obtain authorization to make the recommended changes. Updates, revisions, corrections, and waivers to this SOP shall be made in writing and approved by the GM.

8.1. Policy Owner: Assistant General Manager – Operations (AGM-O)

8.2. Authorization: General Manager

Effective Date	Revision Letter	Document Authors	Description of Change
Page 1	A	Frank Sablan Antonette Dione Gutierrez	Initial Release of SOP

9.0 References

9.1. Office of Water Programs. “High-Velocity Cleaner (HVC).” Sacramento State University. https://www.owp.csus.edu/glossary/high-velocity-cleaner.php.

9.2. SOP-1500-WP-001, *Water Outage and Road Closure Notifications to the Media/Public*.

9.3. *CCTV Sewer Line Inspection* SOP.

Attachment 1: Equipment and Supply Inventory List

GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, Guam 96913
franks@guamwaterworks.org

HYDRO FLUSHING
EQUIPMENT AND SUPPLY INVENTORY LIST

- High Velocity Jetter
- Combination Sewer Cleaning Truck
- Main Jetter Hose (1/2", 3/4", 1")
- Hydrant Hose
- Discharge Hose
- Level Hose Indicator
- Manhole Hook (Magnetic)
- Cleaning Nozzles
- Hydrant Wrench
- Cresent Wrench
- Pipe Wrench
- Pipes (6" and 8")
- Clamps
- Strainer
- Gloves
- Safety Cones
- Safety Signs
- Sledge Hammer
- Pry Bar
- Orffices Spare
- Orffices Cleaners
- Nozzles Skids
- Nozzle Nipples
- Allen Wrench Set
- Ropes
- Bungee Cords
- Tire Chocks

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Attachment 2: Heavy Equipment Pre-Departure Checklist

GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, Guam 96913
franks@guamwaterworks.org

HYDRO FLUSHING
HEAVY EQUIPMENT PRE-DEPARTURE CHECKLIST

OPERATOR 1 (DRIVER): _____
OPERATOR 2 (PASSENGER): _____
SUPERVISOR: _____

DATE: _____
DIVISION: _____
CONTACT NO.: _____

HEAVY EQUIPMENT HISTORY

LICENSE PLATE NO.: _____ **REGISTRATION EXP DATE:** _____ **GAS LEVEL:** _____

ODOMETER READING START: _____ END: _____

ENGINE HOURS START: _____ END: _____

Safety	Good	Fair	Poor
Triangle	☐	☐	☐
Cones	☐	☐	☐
PPE's	☐	☐	☐
Tire Chuck	☐	☐	☐
Directional Lights	☐	☐	☐
Truck Cleanliness	☐	☐	☐

Tires	Good	Fair	Poor
Wear	☐	☐	☐
Damage	☐	☐	☐
Tire Inflation	☐	☐	☐

Fluid Levels	High	Normal	Low
Crankcase Oil	☐	☐	☐
Transmission Fluid	☐	☐	☐
Hydraulic Fluid	☐	☐	☐
Windshield Fluid	☐	☐	☐
Radiator Coolant	☐	☐	☐
Engine Oil	☐	☐	☐

Chassis	Good	Fair	Poor
Suspension	☐	☐	☐
Components	☐	☐	☐

Engine Off	Good	Fair	Poor
Drive Belts	☐	☐	☐
Hydro Meter	☐	☐	☐
Fan	☐	☐	☐
Alternator	☐	☐	☐
Brake Function	☐	☐	☐
Instrument Gauge	☐	☐	☐
Windshield Wiper	☐	☐	☐
Water Pump	☐	☐	☐

Tools	Good	Fair	Poor
Manhole Hook	☐	☐	☐
Sledge Hammer	☐	☐	☐
Hydrant Wrench	☐	☐	☐
Pipe Wrench	☐	☐	☐
Tool Bag	☐	☐	☐
Tiger Tail	☐	☐	☐
Hose Reel	☐	☐	☐
LDR Hose	☐	☐	☐
Jetter Hose	☐	☐	☐

Engine On	Good	Fair	Poor
Engine Sound	☐	☐	☐
Exhaust	☐	☐	☐
Emergency Brake	☐	☐	☐
Power Steering	☐	☐	☐
Turn Signal Rear L&R	☐	☐	☐
Turn Signal Front L&R	☐	☐	☐
Clearance Lamps (F)	☐	☐	☐
Clearance Lamps (R)	☐	☐	☐
Marker Lamps (F)	☐	☐	☐
Marker Lamps (R)	☐	☐	☐
Mirror (Driver)	☐	☐	☐
Mirror (Pass.)	☐	☐	☐
Emergency Beacon	☐	☐	☐

Interior	Good	Fair	Poor
Cab Lights	☐	☐	☐
Horn	☐	☐	☐
Heating &	☐	☐	☐
Inst. Panel Lights	☐	☐	☐
Inst. Panel Gauge	☐	☐	☐
Rearview Mirror	☐	☐	☐
Seating	☐	☐	☐

REMARKS: _____

EMPLOYEE NAME: _____ SIGNATURE: _____ DATE: _____

SUPERVISOR/
MANAGER: _____ SIGNATURE: _____ DATE: _____

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Attachment 3: Employee's Acknowledgement Receipt

GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, Guam 96913
franks@guamwaterworks.org

HYDRO FLUSHING
EMPLOYEE'S ACKNOWLEDGMENT RECEIPT

I, the undersigned, an employee of the Guam Waterworks Authority, hereby acknowledge receipt of SOP-1500-WWC-001 entitled "*Hydro Flushing*" this _____ day of _____, 20____.

Employee's Name/Badge No.:	Employee's Signature:	Date:

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