



Standard **Operating Guideline**

**Canal Safety**

District Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date Prepared: Date Revised:

OBJECTIVE:

* Ensure effective system-wide preventive and predictive maintenance actions.
* Ensure periodic task accomplishment.
* Identify potential/actual system problems.
* Maintain optimum water flow/service to water customers.

RATIONALE/PURPOSE:

* Ensure mission capability.
* Ensure system reliability.
* Develop predictive maintenance programs.
* Determine capital improvement budgeting.
* Develop loss trend analysis.
* Reduce property, liability, and injury/illness loss exposures.
* Reduce revenue loss/or O&M cost.

METHODS/PROCEDURES:

***(Note: Listed procedures are intended as guidelines only and may not be applicable for all districts or situations).***

Safety

* Install and maintain “No Trespassing” signs, gates, and fences to restrict unwanted public access where practical. Allow landowner access only where required or necessary.
* Post proper hazard signage if razor wire is used on access gates and fences.

**This model form/template must be customized to meet your Agency’s needs.**

* Install and maintain existing ladders, ropes, and buoys inside flowing canals to allow safe exit from water flows.
* Install and maintain posts and guard rails to prevent cars from driving in the canal.

Community Outreach

* Conduct public awareness campaigns at schools and community events.

Risk Control Best Practices

* Maintain hazard signs at siphons.
* Install screens at siphons.
* Install pipes on top of energy dissipater to indicate underwater hazards.
* Use backhoes or similar equipment to reduce hazardous manual activity such as debris or board removal.
* Avoid driving on wet or otherwise slippery canal banks.
* At least one U.S. Coast Guard-approved 30-inch life ring, with not less than 90-feet of 600-pound capacity line attached, shall be kept in a conveniently accessible place where employees work exposes them to the hazard of drowning, or each employee so exposed shall wear a U.S. Coast Guard-approved personal flotation device.
* A second rope, suitable for securing a rescuer should also be in place. Each rope should be 150-feet long and 600-lb capacity. In the event of a rescue, the second person out of the water should be connected to the primary rescuer by means of the second rope.
* Any personal flotation device shall be approved by the United States Coast Guard as a Type I PFD, Type II PFD, Type III PFD, or their equivalent, and maintained in good condition.
* Single employees pulling debris from canals shall remain behind the guard rails.
* After dark, two or more employees will work together in removing trash from canals.
* Heavy accumulation of debris in the water shall be removed by a backhoe or other mechanized equipment, if possible.

Fall Protection

**(*As applicable for canals with high velocity flows, deep water, or other safety concerns or risks*).**

* Install guard rails on elevated areas over water to allow handholds and fall protection anchor points. Guardrails should be installed over walkways, 42-inches high with a mid-rail.
* Fall arrest anchors in the form of static lines or rails with trolleys are the preferred method of attachment to allow movement.
* If lanyards are used, they shall be adjusted to prevent falls and entry into the water.
* Use additional retrieval lines and winch (or other means of retrieval) shall be used. All equipment shall be approved for such use.
* Install slip proof decking on elevated areas over water to reduce the risk of slipping.
* Employee’s feet shall remain in contact with the walkway at all times when removing debris from the water. If guard rails are not present, employees shall use a fall restraint or fall arrest system with a backup person present.
* In dry canals, fall protection shall be provided at distances over 6-feet from the bottom of the canal.

INCIDENT RESPONSE: **See Canal Failure Response SOG**

* Call 911 for drowning or severe injuries.
* Administer first aid and CPR.

SAFETY CONSIDERATIONS:

An effective maintenance program can help to prevent damage to property, the environment, and injury to employees and the public, and will help to:

* Preclude system and equipment damage.
* Preclude property and environmental damage.
* Facilitate operations and maintenance personnel safety.

Identification of safe work practices among employees should include:

* Train employees and document.
* Fall protection equipment use, maintenance, and inspection.
* Traffic control.
* Canal safety.
* Proper footwear.
* CPR and first aid training.
* Safe crane and heavy equipment operation.
* Crane inspection and certification (if required).
* Crane operator training and certification (if required).

COST/ BENEFIT:

* Reduce revenue losses.
* Preventive maintenance and loss trend data would reduce facility, equipment, and system failures.
* Avoid costly liability, property, and injury/illness losses.
* Create a manageable capital improvement budget to support effective O&M practices.

INSPECTION FORMS/CHECKLISTS/DOCUMENTATION:

* Training Log.
* Canal Structure Inspection Form.

REFERENCES:

* [U.S. Bureau of Reclamation, Canal Operators Manual, January 2018](https://www.usbr.gov/assetmanagement/docs/Canal%20Operator%20Manual.pdf)
* [U.S. Bureau of Reclamation, Canal Operation, and Maintenance: Embankments, November 2017](https://www.usbr.gov/assetmanagement/docs/Canal_Embankments.pdf)
* [U.S. Bureau of Reclamation, Canal Safety Program](https://www.usbr.gov/pn/about/otto/index.html)
* [U.S. Army Corps of Engineers, Levee Owner’s Manual for Non-Federal Flood Control Works, March 2006, Section 2.6.](https://www.nae.usace.army.mil/Portals/74/docs/Emergency%20Operations/USACE_NonFed%20Levee%20Owner's%20Manual_Mar06.pdf)
* [CCR, Title 8, Section 3389 (Life Rings and Personal Flotation Devices)](https://www.dir.ca.gov/title8/3389.html#:~:text=%C2%A73389.,Rings%20and%20Personal%20Flotation%20Devices.&text=The%20employer%20shall%20inspect%20each,the%20device%20unsuitable%20for%20use.)
* [Cal-MUTCD – Traffic Control Manual/Procedures](https://dot.ca.gov/-/media/dot-media/programs/traffic-operations/documents/ca-mutcd/rev-5/camutcd2014-part6-rev5.pdf)