

Standard Operating Guideline – Canal/Ditch/Levee Maintenance

Standard Operating Guideline (SOG)

Title: **CANAL/DITCH/LEVEE MAINTENANCE**

District Name: _____

Date Prepared: _____ Date Revised: _____

OBJECTIVE:

- Ensuring 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 and/or O & M cost

METHODS / PROCEDURES:

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

Construction

- Key in sandy levees. Dig down below grade with trencher/excavator and add clay or heavy soil. Clay material can be used, is less expensive than concrete, and is cohesive. Bentonite (clay) can be effective, but is more expensive than other types.
- Light fill is less stable than natural earth, and may require keying in with concrete slurry for short distances.
- Canal banks above ground are generally less stable and more likely to leak than canals below grade.

Standard Operating Guideline – Canal/Ditch/Levee Maintenance

- Bank erosion can be problematic in some areas. Armor the banks with rip-rap where necessary. Use of asphalt as rip-rap is generally prohibited.
- Place rip-rap at both edges of concrete liner to protect the upstream and downstream edges, and other problem areas (such as curves).
- Slope sides of levees and banks at 2.5:1 to 3:1, as easement allows. Widening the bank if allowed makes the bank more stable, has less rodent problems, and is easier to maintain.
- Banks and levees should be compacted to District requirements or standard practices as appropriate.
- Banks and levees may have to be a specific height to meet requirements for floodways or waterways, or other regulatory requirements.
- Use “sheep’s foot” attachment on equipment to compact the soil.
- Build wide and level roadways on banks to allow access by equipment to maintain and repair.
- Top the bank roadways with decomposed granite (DG) or similar road materials, to make the road passable in wet weather and reduce erosion.
- Lime treatment makes bank very hard, less susceptible to erosion, and more stable.
- Increase freeboard from 1 – 2 feet (raise the sides) if possible, to reduce the possibility of overflow.

Easement/Right of Way

- Monitor and eliminate unauthorized encroachment to allow access to all areas of canal, for maintenance and repair activities.
- Research and understand District easements, and keep resource documents readily accessible on short notice.
- Lock access gates, if necessary.
- Maintain “No Trespassing” signs.
- Add regulation reference to “No Trespassing” signs.

Periodic Reshaping

- Reshape all banks to maintain the canal “prism” cross section, reduce rodent activity, and reduce the need for spraying of weeds.

Standard Operating Guideline – Canal/Ditch/Levee Maintenance

- Reshaping should be done periodically, based on District practices. If not all done annually, ___% per year. Problem areas should more frequent and get higher priority for repair.
- Rework longer areas (1/4 mile) instead of single point of break, to prevent failure at areas adjacent to repair area.
- Keep extra equipment (grader) available to be able to reform all canals annually in maintenance season.
- Conduct invert surveys as needed.
- Dredge the bottom of canal/ditch as needed to maintain proper depth.

Preventive Maintenance

- Regularly inspect canals and levees during water run and when dry.
- Do complete inspection at end of season, and set priorities for maintenance before next water season.
- Clean creeks periodically, remove brush out of the bottom. A permit may be required from Fish and Game and/or other regulatory agencies.
- Monitor dumping, and remove debris/articles from ditch to maintain optimum flow, especially at the start of water season.
- Dig out bottom of basins and use the material to flatten side slopes, preferably to get 6:1 or 7:1 slope. This does not change capacity, allows mowing instead of spaying, and is safer in case someone drives into basin. It is also less attractive to off-roaders, has less rodent activity, and has much less chance of unwanted lateral seepage.
- Use a metal downspout on top of the soil to direct runoff to prevent erosion in problem areas.
- Use drag chain on inside of canal or other means to mechanically knock down weeds, and then reshape the banks as needed.
- Keep unauthorized vehicles off of roads to reduce dust and damage to banks by motor vehicles.
- Mud jack minor leaking areas to prevent failure. Drill a hole behind liner, pump in adobe/cement/water slurry with concrete pump.

Incident Response: See Canal Failure Response SOG

Standard Operating Guideline – Canal/Ditch/Levee Maintenance

SAFETY CONSIDERATIONS:

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

- Traffic control on job sites in the field
- Fall protection on construction and excavation projects
- Employee training and associated documentation

COST/ BENEFIT:

- Reduce revenue losses
- Preventive maintenance and loss trend data would reduce facility, equipment, 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 Record
- Canal Maintenance Log
- Leak/Break/Damage Checklist
- Canal Inspection Items
- Canal Structure Inspection Form
- Canal Breach Report

REFERENCES:

- U.S. Army Corps of Engineers, Levee Owner's Manual for Non Federal Flood Control Works, March 2006, Section 2.6. www.usace.army.mil/Emergency/Pages/home.aspx