

# IS - 7 – Concrete-Lined Ditch Irrigation System

**Achieving Irrigation Water Management (IWM) with Concrete Lined Ditches**



**Why replace earthen ditches with Concrete Lined Ditches?**  
**The ditch in this picture is subject to friction losses, erosion, seepage and irrigation water is difficult to quantify.**  
**Efficiency will be greatly improved by concrete lining.**  
**Irrigation water management will be achievable.**



- **Current (2007) average cost of a concrete lined ditch is approximately \$26/linear foot (cost can vary greatly according to construction methods)**
- **This structure requires enough water (gallons per minute or cfs) in order to work effectively**
- **Used primarily for irrigation water delivery on surface flood irrigation systems**
- **Fields should be graded border systems and/or level basins**
- **Works well with all cropping systems**

## IWM works with Surface Irrigation

- Concrete Lined Ditches are capable of delivering high flows to a field, enabling a high irrigation efficiency.

### 2 Types of Concrete Lined Ditches

**Slip-Form Ditch**



**Hand Placed Ditch**



## Slip-Form Ditch

Can be used with High Flow Turnouts or pull gates



**Slip form ditch under construction**



When finished, this lined ditch will allow for the efficient conveyance of water.

# Irrigation Water Overflowing from Hand-Placed Ditch to Field on Right

Left side is 4" higher than right



This hand-placed ditch acts as weir flow, which minimizes irrigation-induced erosion and distributes water evenly

# Hand-Placed Concrete Lined Ditch

**Hand-placed ditches  
are installed in sections**



This ditch is undercut and soil erosion is uncontrolled



An apron reduces the undercutting and erosion





Division Boxes are used with both types of CLD



Constructing a division box.

Replogle flumes are used to measure irrigation water – note rule at right



Replogle flumes are also known as broad crested weirs



# **Benefits of Lining a Ditch**

**Conserves water (e.g. reduces friction loss and seepage loss from earthen ditches)**

**Minimizes irrigation-induced erosion and invasive weed growth**

**Works well with a gravity system; No pumping is required.**

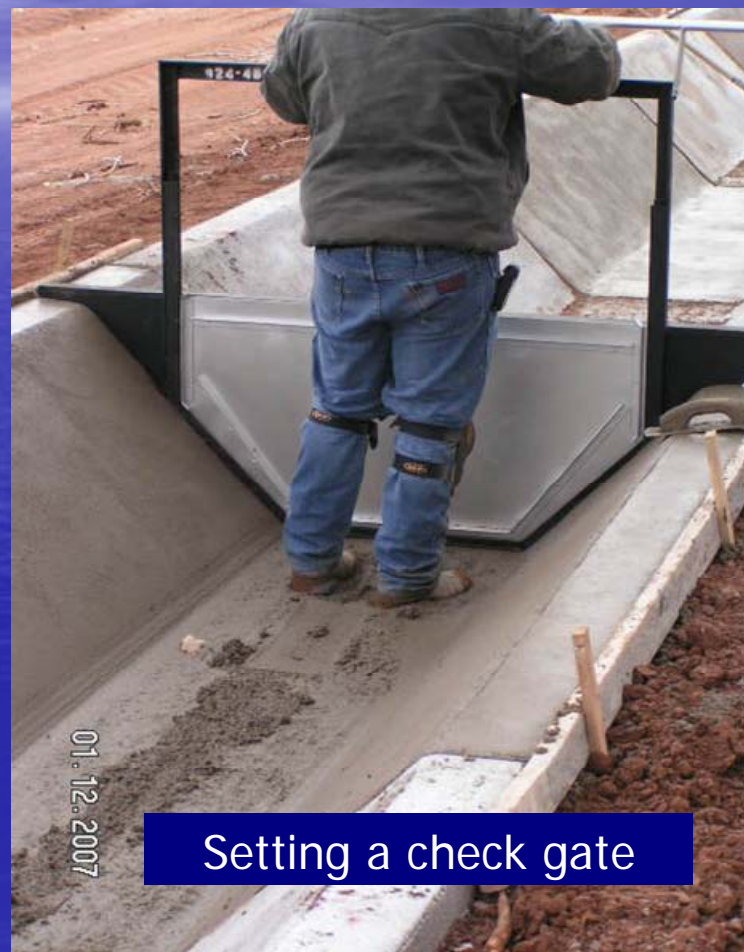
**Maintenance is minimal compared to a dirt ditch and works well in conjunction with irrigation pipeline; less labor intensive**

**Will work on any field, regardless of shape and can be tailored to site-specific conditions**

**Increased irrigation uniformity means increased yields and uniform crop quality**

# Considerations

- **Cost of construction**  
Varies according to thickness of lining, 2500 psi concrete required by NRCS standards and specifications
- **Water availability**  
Must be designed to carry adequate flow for crop
- **Field size**  
Size of ditch depends on width and length of area to be irrigated



Setting a check gate

## Considerations



- Weather conditions and temperature  
Must be installed in dry conditions and when temperatures are between 50 and 90 degrees for a period of not less than 7 days
- Crop requirements  
Consumptive use (CU) varies with different crops and according to climate conditions

# Operation & Maintenance

- Practice life of a CLD is approximately 25 years
- Need to address sediment and debris removal
- Exclusion of livestock helps to protect ditch
- Embankment integrity must be maintained
- Ongoing repair necessary - replace cracked or broken canal sections