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

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

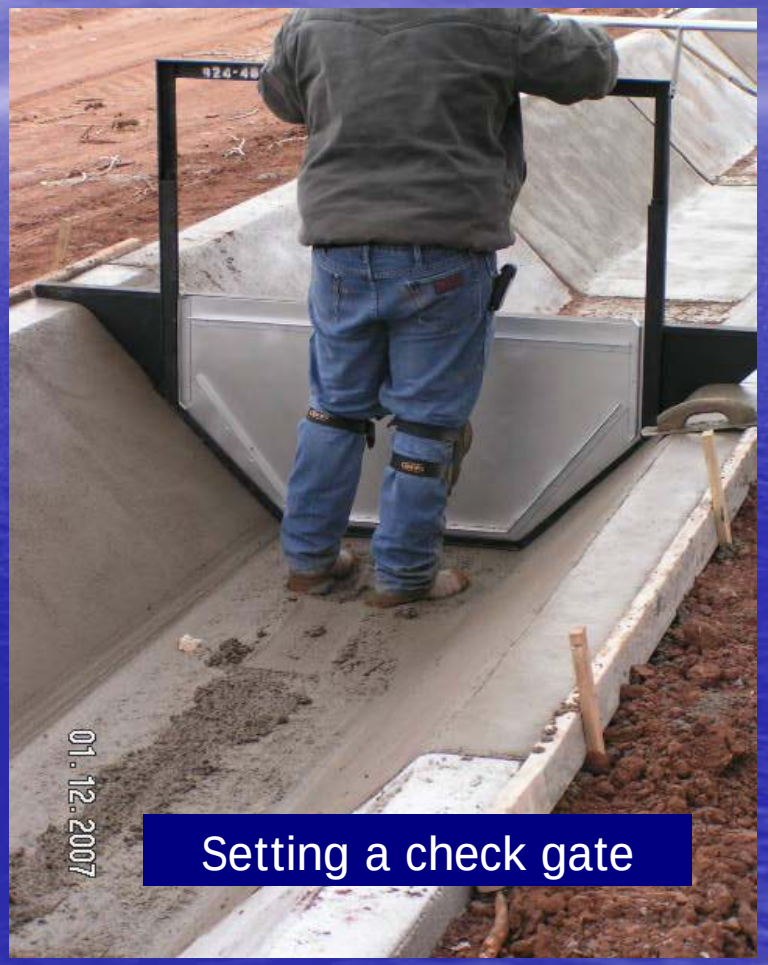
Considerations

- **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