ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

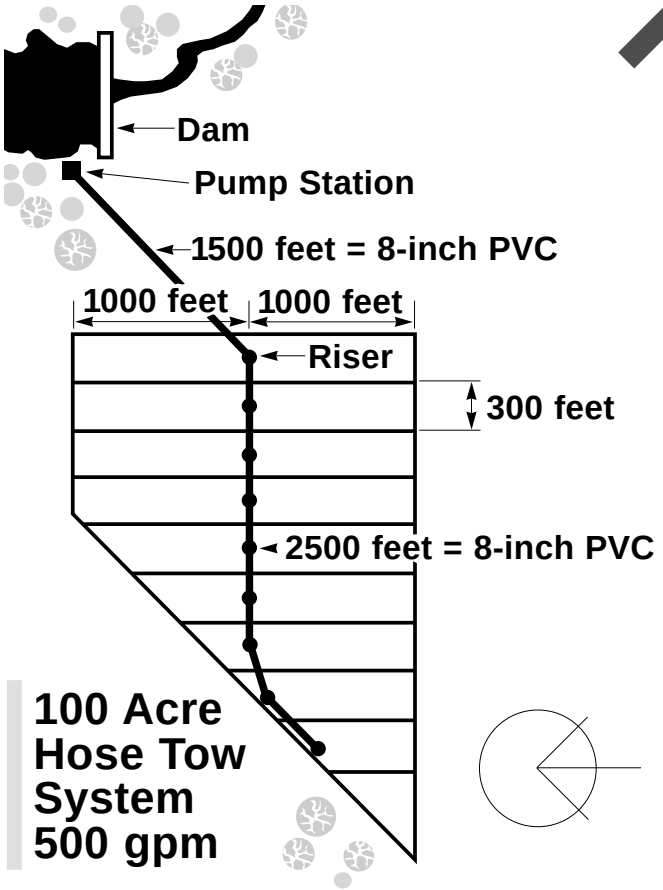
ANR-1081

Hose Tow For Farm Or Wastewater Irrigation

This publication describes a typical hard hose traveler irrigation system, evaluates its adaptability to Alabama conditions for farm and/or wastewater irrigation, and analyzes its initial and annual cost.

Description

The hose tow traveler system in Figure 1 has a 4.5 inch inside diameter by 1,050 foot hose and irrigates rectangular strips 300 feet wide and 1,000 feet long. The irrigation pump delivers the water through underground PVC feet long. The irrigation pump delivers the water through underground PVC [Image] (plastic) pipe to nine risers strategically located throughout the field. The water flows from the riser through the semi-rigid polyethylene hose to a single trailer-mounted large volume sprinkler. A hose reel, located at the riser, turns continuously to roll up the polyethylene hose and pull the trailer mounted gun through the field. Hose tow machines are available with various hose lengths and gun sizes. In this example, this hose reel may be rotated 180 degrees to irrigate two rectangular strips before the hose reel is moved to another riser.



An area up to 7¾ acres can be irrigated in each rectangular strip although smaller areas can be irrigated if a full hose length pull is not possible.

This system uses surface water. For farm irrigation, surface water would be a stream, a creek, or a pond. For wastewater irrigation, surface water would be either a single or two stage animal waste treatment lagoon. In areas where wells are practical, well cost should be determined. Whether to dig a well or to develop surface water or to use a combination of both will depend on local conditions.

The pumping system in this example uses a diesel power source. Three-phase electric power, where available, is also an option for stationary pumps for wastewater irrigation systems where controlling lagoon level is critical throughout the lagoon lifetime. For wastewater irrigation, a float is needed to position the pump suction about 18 inches below the lagoon surface (above the lagoon floor) to prevent solids pick up.

Adaptability

Hard hose traveling systems are most practical in Alabama in small irregular shape fields that will not accommodate large pivots or smaller tow pivot layouts. Under most crop and weather conditions, a single hose tow machine may not effectively irrigate more than 100 acres planted to a single crop. Ideally a single hose tow machine works best on 50 to 65 acres of an early crop, finishing early crop irrigation, then moving to a second 50 to 65 acres for later seasonal irrigation. An example of this would be a corn-peanut or a corn-cotton situation. The 9-risers in Figure 1 could irrigate over 124 acres with two full runs from each riser. In the wastewater situation, nitrogen nutrient strength controls the amount of wastewater that can be applied to the crop during any one growing season. This may be ⅓ to ½ of the

normal irrigation water applied. Typically cost per acre for a wastewater only irrigation situation (no regular supplemental irrigation) may be 50 percent to 60 percent of regular irrigation cost.

While the design described in this publication is not necessarily a recommended layout, it is one example. Each farm or wastewater irrigation site must be evaluated on an individual basis to determine the exact design and component requirements and to develop a cost analysis for that particular location.

Cost Analysis

The cost per acre to purchase, install, and operate an irrigation system will depend on the design requirements for each individual unit. When two irrigation sites have similar characteristics, such as water source, land clearing requirements, field size, shape, and elevation, the component requirements and cost analysis of one site may be used to get an idea of the requirements for the second site.

For the example system discussed here, typical initial costs for each component are indicated and annual per acre ownership and operating cost are estimated. Annual costs are calculated for the useful life of the equipment. Available tax credits, other tax advantages, and federal or state cost-share for animal waste management systems are not figured in this example, but would reduce ownership cost when available.

The loan repayment period for purchasing irrigation equipment is usually much shorter than the useful life used for calculating ownership cost. If this is true, annual ownership cost may underestimate the actual cash flow needed to meet loan obligations during the repayment period. Equipment leasing is an alternative to direct purchase of irrigation equipment and may be desirable in some cash flow situations.

A breakdown of component costs follows for the irrigation system illustrated. Annual per acre ownership and operating costs are also calculated.

Cost Analysis Of Irrigation Systems
Traveler Unit Hose Tow 100 Acres - One Gun
A. Components—Investment Cost

	Initial Cost	Years Useful Life	Yearly Depreciation
1. Hose Tow Unit 1 Hose Tow Unit, all attachments, 1,050 feet x 4-inch hose	$31,980	10	$3,198
2. Power Unit and Pump 62 Continuous Horsepower Diesel Centrifugal Pump 512 gpm 350 TDH	$12,800	10	$1,280
3. Risers—6-inch 9 risers $ 145 /riser	$1,305	20	$66
4. PVC Pipe (price installed) 6-inch - ___feet x $___ /foot 8-inch—4,050 feet x $ 5.25 /foot	$21,262	20	$1,063
5. Pipe Fittings and Concrete	$750	20	$37
6. Miscellaneous	$2,136	—-	—-
Total Cost	$70,233		$5,644
Total Cost Per Acre	$702		$56.44

B. Annual Ownership Costs

1. Yearly Depreciation(From Table A)	$ 5,644
2. Interest on Average Investment (9%)	$3,160
3. Insurance on Average Investment (0.7%)	246
Total Annual Ownership Cost	$9,050
Total Annual Ownership Cost Per Acre	$90.50

C. Annual Operating Costs (Per Acre-Inch Of Water Applied)

1. Fuel ($1.00/gallon)	$ 3.45
2.Oil ($4.50/gallon)	$0.29
3. Repairs — Power Unit	$0.30
4. Repairs — Irrigation Unit	$0.41
5. Labor ($6.00/hour)	$0.90
Total Operating Cost Per Acre-Inch	$ 5.35
Annual Operating Cost For Year Requiring 7 Acre-Inches Of Water	$ 37.45

D. Annual Total Costs For Owning And Operating An Irrigation System During Year Requiring 7 Acre-Inches Of Water

Total Annual Cost Per System	$12,795
Total Annual Cost Per Irrigated Acre	$127.95

Thus, additional yield worth at least $ 127.95 per acre would be required to cover the ownership and operating cost for this system.

Additional production costs resulting from higher fertilizer rates, additional seed, increased harvesting and drying costs, incurred due to intensified irrigation would also have to be covered in order to offset all additional expenses. Nutrient value of wastewater may reduce higher fertilizer costs.

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By **Ted. W. Tyson,** *Extension Agricultural Engineer,* Associate Professor, and **Larry M. Curtis,** *Extension Agricultural Engineer,* Professor, both in Agricultural Engineering at Auburn University.

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