ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

ANR-1044

Tow Pivot For Farm Or Wastewater Irrigation

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

Description

The 40-acre center pivot system in Figure 1 is designed to tow between two pivot points. With this system, a total of 80 acres can be irrigated.

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 particularly for stationary pumps used for wastewater irrigation systems, where controlling the lagoon level is critical throughout the lagoon lifetime.

Component requirements for the towable system in Figure 1 are basically the same as for a single 40-acre system. The only additional components are the 1,500 extra feet of pipe and the second pivot point. For wastewater irrigation, a float is needed to position the pump suction about 18 inches below the lagoon surface (but above the lagoon floor) to prevent solids pickup.

Adaptability

A tow pivot is practical in many areas in Alabama where large pivots cannot be used because of field size and shape. Towing systems are most adaptable to a multiple crop farm where water demand for each crop occurs at different times during the growing season. This allows using the system on one circle, finishing the crop irrigation there, then moving to a second circle for that crop's seasonal irrigation. An example of this would be a corn-peanut or a corn-cotton situation. In the wastewater situation, a tow pivot allows the reduced labor associated with a pivot to be used in smaller fields.

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 costs 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 actual cash flow needed to meet loan obligations during the repayment period. An alternative to direct purchase of irrigation equipment is equipment leasing. This may be desirable in some cash flow situations

A breakdown of component costs is shown on pages 2, 3, and 4 for the irrigation system illustrated on page 2. Annual per acre ownership and operating costs are also calculated.

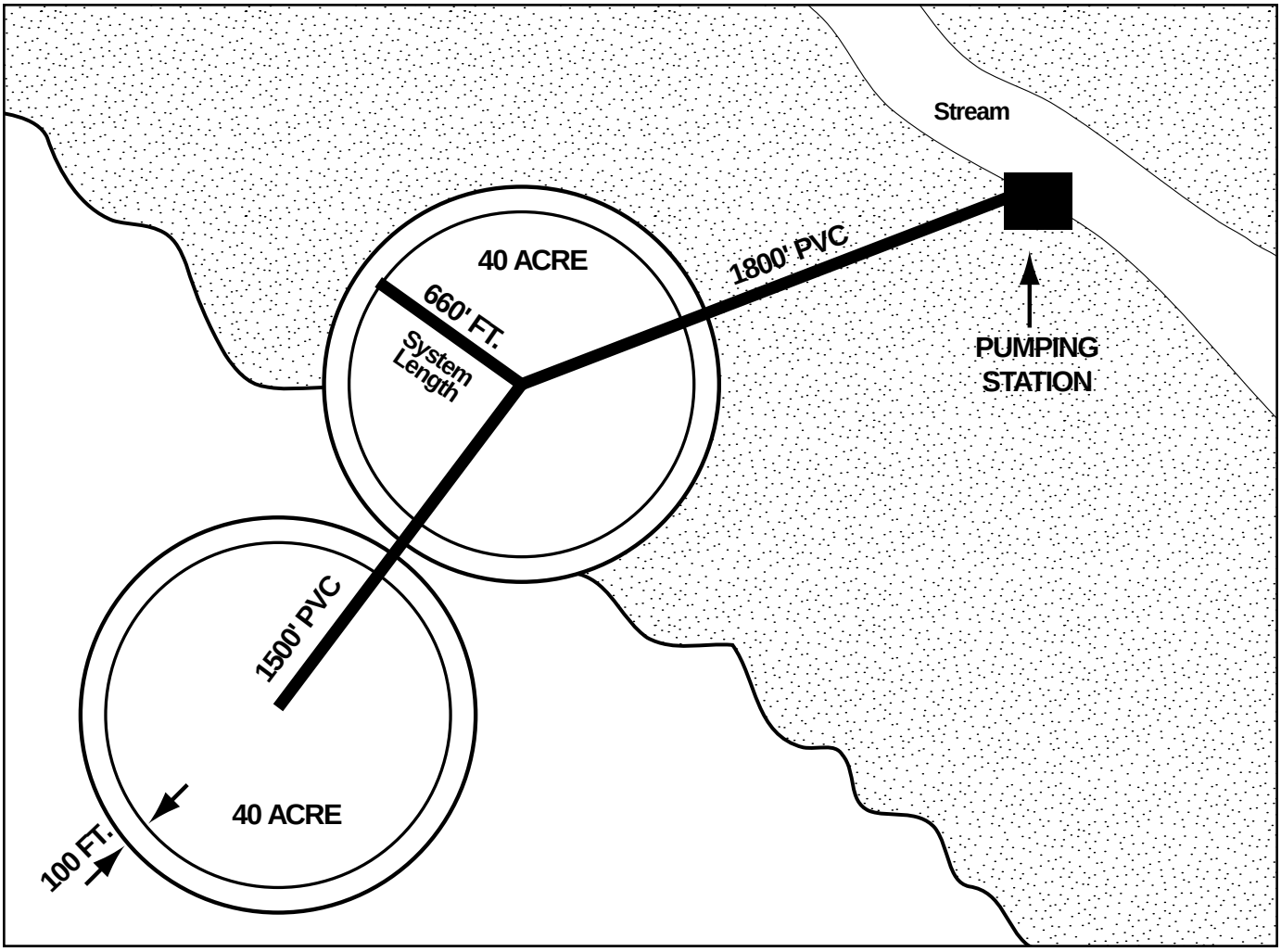

Figure 1. A center pivot irrigation system (80-acre coverage, 2 pivot points).

Cost Analysis Of A Center Pivot Irrigation System

80-Acre Coverage, 2 Pivot Points

	Initial Cost	Years Useful Life	Yearly Depreciation
A. Basic System–Investment Cost			
1. System, Electric Drive*	$24,225	20	$1,211
Length = 660 feet End gun coverage = 100 feet			
2. Freight, Installation	4,353	20	218

3. Power Unit And Pump	11,100	10	1,110
28 Horsepower - Minimum Continuous Centrifugal Pump 260 gpm @ 292 TDH			
4. Generator For Pivot, 7.5 kw.	8,675	15	578
5. PVC Pipe (installed)			
6 inch 3,280 feet x $ 4.61/foot	15,154	20	758
6. Pipe Valves, Fittings, Concrete	850	20	43
7. Miscellaneous	1,800	----	----
Total Cost	**$66,157**		**$ 3,918**
Total Cost Per Acre	**$827**		**$49**

B. Annual Ownership Costs

1. Yearly Depreciation	$ 3,918
2. Interest on Average Investment (9%)	2,977
3. Insurance on Average Investment (.7%)	232
Total Ownership Cost	**$ 7,127**
Total Ownership Cost Per Acre	**$89.09**

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

1. Fuel ($1.10/gallon)	$2.77
2. Oil ($4.50/gallon)	0.24
3. Repairs–Power Unit	0.32
4. Repairs–Irrigation Unit	0.59
5. Labor ($6.00/hour)	0.12
Total Operating Cost Per Acre-Inch	**$4.04**
Total Operating Cost For Year Requiring 7 Acre-Inches Of Water	**$28.28**

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

Total Annual Cost Per System	**$9,389.00**
Total Annual Cost Per Irrigated Acre	**$117.37**

Additional yield worth at least $118 per acre would be required to cover the ownership and operating cost for this system.

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*System options include end gun, running lights, automatic end gun control, automatic stop, booster pump, sprinkler and towing package, and low pressure shut-off.

**Additional production costs resulting from higher fertilizer rates, additional seed, increased harvesting and drying costs, etc., 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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Ted W. Tyson, *Extension Agricultural Engineer,* Associate Professor, **Larry Curtis**, *Extension Agricultural Engineer*, Professor, both in Agricultural Engineering at Auburn University.

Adapted from: Curtis, Larry M., Larry W. Roberts, and Ted W. Tyson. 1986. Irrigation System Cost Analysis '85 - '86. Timely Information EE85-86-2. Alabama Cooperative Extension System. Auburn University, AL.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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