



Investment Costs For Gravity Irrigation Systems

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Purchase of an irrigation system is a big investment — an investment you should consider carefully before making the commitment. Many farmers in Idaho have purchased sprinkler systems to reduce labor costs, make better use of available water or to irrigate fields where gravity systems are not practical. The high cost of energy and capital, along with advances in technology, have made gravity systems seem more attractive.

This publication should serve as a guide if you are considering investing in an irrigation system. The figures are based on example situations. To tailor these figures more closely to your situation, make adjustments to the various cost figures where the data are available.

The cost figures were current as of January 1980 and include:

- **System investment** — the purchase and installation cost of the complete system. Certain elements of gravity irrigation systems are presently eligible for investment tax credit and accelerated depreciation. Check with your tax advisor regarding eligibility before investing. These effects on income in the year purchased could make the investment more favorable.

- **Per acre variable costs** — the annual cash expenses for operating the system. These costs

include a district water fee, labor and maintenance of the system. Water is purchased from a district



Fig. 1. Gated pipe irrigation system.

at \$4.50 per acre in these examples.

• **Per acre fixed costs** — charges that would be incurred regardless of whether the system is used. Fixed costs include annual depreciation, interest on investment, personal property taxes and insurance fees.

Add the variable and fixed costs. The total is the annual cost for owning and operating the system.

Assumptions Concerning The Semi-Automated Gated Pipe

Land and Water

The gated pipe system was considered for three different runs of 660, 990 and 1,320 feet representing irrigated acreages of 20, 30 and 40 acres respectively. The gates are on a 30-inch spacing, and the split-set technique for reducing water flow during the set is assumed. This technique increases water efficiency and reduces furrow erosion.

Water is purchased from a district at \$4.50 per acre. The charge under the variable cost section is per irrigated acre as are all other per acre figures. A total of 25.71 inches applied for the season is a weighted average for the crop rotation of 1 year of spring grain, 3 years of alfalfa hay, 2 years of beans and 1 year of sugarbeets.

Equipment

The semi-automated gated pipe system assumes 1,132 feet of

Table 1. Irrigation costs for semi-automated gated pipe gravity systems on 20, 30 and 40 acres.¹

System investment	Run length		
	660' (20 acres)	990' (30 acres)	1,320' (40 acres)
Mainline	\$ 4,132.00		
Gated pipe	3,696.00		
Valves, risers, hydrants, timers	3,716.00		
Pipetrailer	375.00		
Total investment	\$ 11,919.00		
Variable costs per irrigated acre	Run length		
	660' (20 acres)	990' (30 acres)	1,320' (40 acres)
System maintenance (1.5% of investment)	\$ 8.95	\$ 5.96	\$ 4.47
Labor @ \$3.75/hr	6.92	4.61	3.46
	(1.85 hr)	(1.23 hr)	(0.92 hr)
District water fee ²	4.67	4.67	4.67
Tractor & trailer @ \$2.90/hr	1.02	0.68	0.51
	(0.35 hr)	(0.23 hr)	(0.18 hr)
Interest on operating capital (6 mo @ 12% APR)	1.92	0.96	0.79
Total variable costs per acre	\$ 23.48	\$ 16.88	\$ 13.90
Fixed costs per irrigated acre			
Depreciation (straight-line) and interest (12%)	\$ 79.64	\$ 53.10	\$ 39.82
Taxes and insurance	10.40	6.94	5.20
Total fixed and variable cost per irrigated acre	\$113.52	\$ 76.92	\$ 58.92

¹Powell, T. A., B. L. Calkins and K. H. Lindeborg. 1980. Irrigation costs for southern Idaho. Univ. of Idaho Progress Report 213.

²District water fee of \$4.50 per acre and adjusted to irrigated acres in field.

10-inch PVC mainline, 1,320 feet of 8-inch aluminum gated pipe and accompanying risers, valves, hydrants and autocutback timers.

Labor

An estimated 28 hours is needed to lay out pipe and set gates for the first irrigation. An additional 7 hours of tractor/trailer use to move pipe to and from the field is assumed. Each in-season irrigation is estimated at 1.6 hours. This equals 0.253, 0.169 and 0.126 hours per irrigation per acre for the respective run lengths. Total seasonal labor amounts to 36.9 hours.

Investment in the system is the same for the three run lengths

considered. Longer runs will reduce the investment per acre. Land leveling was not included as an investment cost in this study. However, local conditions may call for leveling.

Geographic, soil and other factors will modify these cost figures.

Assumptions Concerning The Siphon Tube Irrigation System

Land and Water

For the siphon tube system, three run lengths are considered. The 660-, 990- and 1,320-foot

Table 2. Irrigation costs for siphon tube gravity systems on 20, 30 and 40 acres.¹

System Investment			
Head ditch		\$ 3,696.00	
Tubes		818.00	
Checks		55.40	
Total investment		\$ 4,569.40	
Variable costs per irrigated acre			
	Run length		
	660' (20 acres)	990' (30 acres)	1,320' (40 acres)
Maintenance (1% of investment)	\$ 2.28	\$ 1.52	\$ 1.14
Labor @ \$3.75/hr	21.86	14.58	10.93
	(5.83 hr)	(3.89 hr)	(2.91 hr)
District water fee ²	4.80	4.80	4.80
Interest on operating capital (6 mo @ 12% APR)	1.74	1.25	1.01
Total variable cost/acre	\$ 30.68	\$ 22.15	\$ 17.88
Fixed costs per irrigated acre			
Depreciation (straight-line) and interest (12%)	\$ 31.04	\$ 20.69	\$ 15.52
Taxes and insurance	3.86	2.57	1.93
Total fixed cost/acre	\$ 34.90	\$ 23.26	\$ 17.45
Total variable and fixed cost per irrigated acre	\$ 65.58	\$ 45.41	\$ 35.33

¹Powell, T. A., B. L. Calkins and K. H. Lindeborg. 1980. Irrigation costs for southern Idaho. Univ. of Idaho Progress Report 213.

²District water fee of \$4.50 per acre adjusted to irrigated acres in field.

runs correspond to 20-, 30- and 40-acre fields. Because of geographic conditions, ditch placement, amount of fall across a field or other factors, the practical length of run in a field varies considerably. Several lengths are shown to illustrate potential cost savings with longer runs. The furrows are assumed to be on a 30-inch spacing with one siphon tube per furrow.

Water is drawn from a ditch or canal alongside the field. Although a water fee of \$4.50 per

acre is used here, the amount may vary by water district. In most areas payment of the water fee is necessary to maintain water rights whether or not the water is used. This water charge, along with the other variable costs, is shown on a per irrigated acre basis in Table 2. Total water applied for the season is 25.71 inches, a weighted average for the crop rotation of 1 year of spring grain, 3 years of alfalfa hay, 2 years of beans and 1 year of sugarbeets.

Equipment

A 1,320-foot head ditch lined with concrete (16 inches by 35 inches by 12 inches) using 10 galvanized steel checks to control water flow is assumed; 528 double bend 60- by 1-inch siphon tubes are used to irrigate the runs.

Labor

For the 20-, 30- and 40-acre irrigated fields, 0.8, 0.533 and 0.4 hours per irrigation per acre are assumed. Total seasonal labor requirements are 116.6 hours regardless of field size.

Investment in the system is the same for the three run lengths examined. The longer runs reduce the investment per acre. Land leveling is not included in this study. However, local conditions may call for it.

Geographic, soil and other factors will modify these cost figures.

Further References

You may obtain expanded description of these and other irrigation systems in University of Idaho Progress Report No. 213, *Irrigation Costs for Southern Idaho*, May 1980, by T. A. Powell, B. L. Calkins and K. H. Lindeborg.

Other recent Idaho publications on costs of irrigation systems available from county offices of the University of Idaho Cooperative Extension Service are:

CIS 577 Investment Costs for Sprinkler Systems 10 cents
 CIS 579 Investment Costs for Center Pivot Systems..... 5 cents



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