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Investment Costs For Sprinkler 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 surface systems are not practical. In certain areas, gravity sprinkler systems are ideal. For many growers, though, the high cost of energy and capital, along with advances in technology, have changed the feasibility of investing in a system.

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 are current as of January 1980 and include:

- **System investment** — the purchase and installation cost of the complete system. Sprinkler irrigation systems are presently eligible for investment tax credit and accelerated depreciation. These tax advantages in the year purchased should make the investment more favorable.

- **Per acre variable costs** — the annual cash expenses of operating the system. These costs include a district water fee, labor, repair and maintenance of the system and electrical costs for drawing the water from a ditch or reservoir and pumping it at approximately 55 psi through the sprinkler system. Water is purchased from a district at \$4.50 per acre.

- **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.

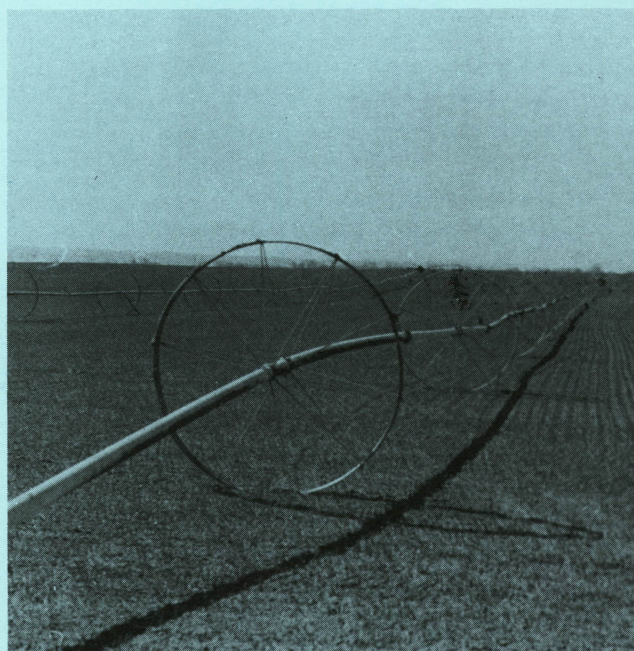


Fig. 1. Wheelline irrigation system.

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

Assumptions Concerning The Wheelline System

Land and Water

The wheelline system design in this example irrigates 154 acres in a 160-acre field. Water is purchased from a district at \$4.50 per acre. The water charge, along with the other variable costs, is shown on a per irrigated acre basis in Table 1. An average of 25.71 inches of water is applied for a crop rotation of 1 year of spring grain, 3 years of alfalfa hay, 2

years of beans and 1 year of sugarbeets. The system is pressurized by a 60-horsepower pump drawing water from a surface source.

Mainline and Laterals

The system mainline consists of three sections of No. 125 PVC pipe — 880 feet of 10-inch pipe, 880 feet of 8-inch pipe and 880 feet of 6-inch pipe. There are also 14 10-inch, 15 8-inch and 15 6-inch risers and valves and an end plug. The seven laterals are 1,300 feet of 4-inch pipe with valve openers and end plugs. The wheelline uses 76-inch wheels and is on a 40- by 60-foot spacing.

Labor

Required labor on this system is estimated at 0.19 hours per irrigation per acre. Total seasonal labor use is 288 hours.

Geographic, soil and other local factors may modify these cost figures.

Assumptions Concerning The Handline System

Land and Water

The handline sprinkler design is for an 80-acre field with 77 acres irrigated. Water is purchased from a district at \$4.50 per acre. The water charge,

Table 1. Irrigation costs for wheelline sprinkler system on 160 acres.¹

System Investment	160 acres
Mainline (pipe, risers & valves)	\$ 13,799.00
Laterals (7)	32,564.00
Pump, motor, electrical, etc.	5,235.00
Reservoir	481.00
Total investment	\$ 52,079.00
Investment per acre	338.18
Variable costs per irrigated acre	
Maintenance (3% of investment)	\$ 10.14
Energy (102,718 KWhr @ 0.0195 KWhr) ²	13.01
District water fee ³	4.67
Labor @ \$3.75/hr	7.01
	(1.87 hr)
Interest on operating capital (6 mo @ 12% APR)	1.82
Total variable costs per acre	\$ 36.65
Fixed costs per irrigated acre	
Depreciation (straight-line) & interest (12%)	\$ 47.19
Taxes and insurance	5.80
Total fixed costs per acre	\$ 52.99
Total fixed and variable costs per irrigated acre	\$ 89.64

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

²Idaho Power Company. 1980. Irrigation and soil drainage pumping service, schedule 24.

³District water fee of \$4.50 per acre adjusted to irrigated acres in field.

along with other variable costs, is shown on a per irrigated acre basis in Table 2. An average of 25.71 inches of water applied per acre based on a crop rotation of 1 year of spring grain, 3 years of alfalfa hay, 2 years of beans and 1 year of sugarbeets is assumed. The sprinklers are pressurized by a 40-horsepower pump drawing water from a surface source.

Mainline and Laterals

The mainline for this system includes 660 feet of 10-inch PVC pipe; 1,320 feet of 8-inch PVC pipe; 660 feet of 6-inch PVC pipe; 13 10-inch, 26 8-inch and 13 6-inch risers and valves; and an end plug. The laterals are placed on a 40- by 50-foot spacing to cover the field.

Labor

Labor to move pipe to and from the field is estimated at 1.5 hours per lateral or 9 hours total for the system. Labor per irrigation is estimated at 0.63 hours per acre. Total seasonal labor requirement is 478.2 hours for the field.

Geographic, soil and other local factors may modify these cost figures.

Table 2. Irrigation costs for handline sprinkler system on 80 acres.¹

System Investment	80 acres
Mainline (pipe, risers & valves)	\$ 14,256.00
Laterals (6)	8,718.00
Pump, motor, electrical, etc.	3,870.00
Pipe trailer	750.00
Reservoir	240.00
Total investment	\$ 27,834.00
Investment per acre	\$ 361.48
Variable costs per irrigated acre	
Maintenance (2% of investment)	\$ 7.23
Electricity (51,282 KWhr @ 0.0216/KWhr) ²	14.42
Labor @ \$3.75/hr	23.29
	(6.21 hr)
Tractor and trailer @ \$2.90/hr	0.34
	(0.12 hr)
District water fee ³	4.67
Interest on operating capital (6 mo @ 12% APR)	2.67
Total variable costs per acre	\$ 52.62
Fixed costs per irrigated acre	
Depreciation (straight-line) and interest (12%)	\$ 48.63
Taxes and insurance	6.34
Total fixed costs per acre	\$ 54.97
Total fixed and variable costs per irrigated acre	\$ 107.59

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

²Idaho Power Company. 1980. Irrigation and soil drainage pumping service, schedule 24.

³District water fee of \$4.50 per acre adjusted to irrigated acres in field.

Assumptions Concerning The Solid Set System

Land and Water

A 40-acre field with 38 irrigated acres and an 80-acre field with 77 irrigated acres are considered. The water charge, along with the other variable costs, is shown on a per irrigated acre basis in Table 3. Although a water fee of \$4.50 per acre is used here, the amount may vary by water district. In many areas, payment of the water fee is necessary to maintain water rights whether or not the water is used. In the variable cost section of the table, the water fee is charged only to the irrigated acres, raising the effective cost slightly.

An average of 26 inches of water applied to potatoes is assumed for this system. The sprinklers are pressurized by 20- and 40-horsepower pumps respectively, drawing water from a canal. Additional investment to irrigate 80 acres vs. 40 acres is \$35,817.00 or a marginal cost of \$918.38 per additional irrigated acre. Marginal variable cost per acre is minus \$1.48 (the larger acreage costs less on a per acre basis).

Mainline and Laterals

Mainline for the smaller system is 1,300 feet of 6-inch portable aluminum pipe. There are 26 laterals, 1,300 feet long and 3 inches in diameter, with valve openers and end plugs. The 80-acre system mainline includes 650 feet of 8-inch and 650 feet of 6-inch portable aluminum pipe. The 52 laterals are the same as for the 40-acre system.

Labor

Labor times of 1 hour per acre for installation and removal of the system plus 0.125 hours per irrigation per acre are assumed. The design is for potatoes requiring 15 irrigations per season. Total labor for the season is 109 and 222 hours for the respective systems.

Table 3. Irrigation costs for solid set sprinkler system on 40 and 80 acres.¹

System Investment	40 acres	80 acres
Mainline	\$ 2,986.00	\$ 3,833.00
Laterals	33,150.00	66,300.00
Pump, motor, electrical, etc.	2,070.00	3,770.00
Pipetrailer	750.00	750.00
Reservoir	120.00	240.00
Total investment	\$ 39,076.00	\$ 74,893.00
Investment per acre	1,028.32	972.64
Variable costs per irrigated acre		
Maintenance (2% of investment)	\$ 20.57	\$ 19.45
Energy @ 0.0215/KWhr ²	14.71	14.52
	(25,935 KWhr)	(51,898 KWhr)
District water fee ³	4.74	4.68
Labor @ \$3.75/hr	10.80	10.81
	(2.88 hr)	(2.88 hr)
Tractor & trailer @ \$2.90/hr	2.98	2.94
	(1.03 hr)	(1.02 hr)
Interest on operating capital (6 mo @ 12% APR)	2.89	2.81
Total variable costs per acre	\$ 56.69	\$ 55.21
Fixed costs per irrigated acre		
Depreciation (straight-line) and interest (12%)	\$ 146.88	\$ 139.36
Taxes and insurance	17.34	16.35
Total fixed costs per acre	\$ 164.22	\$ 155.71
Total fixed and variable costs per irrigated acre	\$ 220.91	\$ 210.93

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

²Idaho Power Company. 1980. Irrigation and soil drainage pumping service, schedule 24.

³District fee of \$4.50 per acre adjusted to irrigated acres in field.

Geographic, soil and other local factors may modify these cost figures.

Further References

You may obtain expanded descriptions 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 578 Investment Costs for Gravity Irrigation Systems	10 cents
CIS 579 Investment Costs for Center Pivot Systems	5 cents



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