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Farm Irrigation Development

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Farm Irrigation Development

Developing and preparing soil for irrigation is each individual farm owner's responsibility, and will vary from farm to farm. But there are some factors that will figure into every case.

First of all, each farmer should develop a farm plan to be used as a guide. Arrangements for technical and construction help will be needed. And a system of financing the development should be arranged before the work is needed.

Developing a farm for gravity irrigation involves many different practices, such as land leveling, farm laterals, drains, channels, and structures. The landowner can secure assistance from many agencies for this work. Technical assistance for planning the development is available through the Soil Conservation Service or the Cooperative Extension Service. Also private engineering firms offer this type of planning service.

The landowner may need financing to complete the development of the land. Commercial lending agencies, Farm Home Administration, Federal Land Bank or other sources of credit may be used. Also the Agricultural Stabilization and Conservation agency may give financial assistance on a cost-share basis. Good planning is essential to good management of the irrigated farm and can mean success or failure.

LAND LEVELING

One of the first practices needed in planning to gravity irrigate is to grade and smooth the land. This is commonly called land leveling. In land leveling the land is not really leveled, but the surface of the slopes are graded to allow water to flow by gravity.

As a result of proper land leveling more even crop stands, improved crop yields, and savings in irrigation water, labor, and other expenses will be gained. Also land erosion will be reduced and soil fertility saved.

The depth and type of soil determine if land leveling is suitable on the land. Depending on the slope, a field may have to be divided into two or more parts, making the grade in different directions. To the landowner the land may appear to be level and sufficient for gravity irrigation. In most cases, however, it will be important that the land be surveyed before attempting gravity irrigation, to be sure that the land is properly sloped. This will save time, labor, and greater expense later.

The Bureau of Reclamation land classification includes only that land which can be leveled at a reasonable cost.

If the farmer wishes he may distribute his irrigation water through sprinkler system instead of leveling. Seldom will land leveling be necessary with sprinkler irrigation.

Farm laterals are open ditches built to convey water from the farm turnout to the individual fields. Temporary ditches are used to distribute water on the various fields.

Ditches should be built with stable side slopes and with banks strong enough to carry the required flow of water safely. Plan the permanent lateral ditches large enough so they will carry ample water for border type of flood irrigation. They should be designed so they will carry their required flows without erosion. Ditches should have relatively flat grades, having a fall of not more than one or two inches per hundred feet. In cases of steeper grades, a channel drop structure will have to be built to control erosion.

In addition to drop structures, other structures to help control and efficiently manage irrigation water may be needed. Division boxes should be installed wherever needed to divide the water supply between two or more ditches. Turnouts should be installed to control flows into laterals or into field head ditches. In order to measure the amount of water flow, measuring devices will need to be installed at each farm delivery point. Siphons or border takeouts are also needed in open ditch type of irrigation.

If heavy land leveling is done with large tractors and scrapers, the land may need ripping so it will have
better water penetration and crop growth. A land plane may be used to remove slight humps and swales. After row crops, the fields should be rotated to maintain the grades constructed during the leveling work.

**TYPES OF IRRIGATION**

Irrigation water can be applied by (1) flooding, or wetting all of the land surface, utilizing borders, basins, or level borders, and well spaced contour field ditches, (2) furrows, or wetting only part of the ground surface, usually in small well-defined, parallel channels, and (3) sprinkling, in which the soil is wetted by spraying water from pipes under pressure.

**DEVELOPMENT COST**

The landowner will be responsible for the development of his land to make it suitable for irrigation. The Bureau of Reclamation and the Soil Conservation Service have made estimates of the cost of developing land according to the land class.

The estimated range in cost per acre is as follows:

<table>
<thead>
<tr>
<th>Land Class</th>
<th>Average Cost per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>$45.00 to $65.00</td>
</tr>
<tr>
<td>Class 2</td>
<td>$45.00 to $95.00</td>
</tr>
<tr>
<td>Class 3</td>
<td>$45.00 to $135.00</td>
</tr>
</tbody>
</table>

It is possible that the cost of development may vary from $20.00 to $140.00 or more per acre. The reason for the spread in cost per acre is because of the topography and conditions of the soil, and the distance and amount of soil that has to be moved.

**DEVELOPMENT STAGES**

It is planned that the lands of the Oahe Unit will be brought under irrigation in blocks or areas of 30,000 to 54,000 acres each. Construction of the distribution systems for these sub-areas will take from 2 to 4 years. This period is called the priming and testing period. During this period, a very small water charge will be made to those who have water available to them. The last acres of this sub-area to be brought under irrigation will determine the last year of the priming and testing period. During this period the government will manage the construction and supply the water.

After the completion of the priming and testing period, a 10 year development period will begin. Sometime during the development period the water users may take over the operation. This procedure will be followed until all sub-areas are developed and brought into the unit.

This 10 year development period is considered a transition period for the irrigator to adjust and develop his farm to irrigation. It is assumed that the average irrigator's gross income will increase during each year of this development period. By the end of the 10 year period, farm adjustments should be complete enough for the operator to pay the full amount of the water charge. A graduated rate for water will be charged during the development period. This will be about 20% of the estimated adjusted payment capacity for the first year and increase each year until 95% of the full payment capacity will be charged beginning the ninth year and 100% beginning the tenth year.

**Example—Estimated Water Rate Schedule During Development Period for Lake Plain Area Figured on an Estimated Average $9.93 Water Charge per Acre**

<table>
<thead>
<tr>
<th>Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
<th>9th</th>
<th>10th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Payment</td>
<td>1.99</td>
<td>2.98</td>
<td>3.97</td>
<td>4.97</td>
<td>5.96</td>
<td>6.95</td>
<td>7.94</td>
<td>8.94</td>
<td>9.43</td>
<td>9.93</td>
</tr>
</tbody>
</table>

After the 10 year development period, the water users will pay maximum water charges for 40 years or more, until irrigator's share of the construction costs have been paid back to the government.

After the farm has been completely developed it will be the farmers responsibility to maintain and manage his farm to keep it in efficient operation. Ordinary farm tillage equipment moves a lot of soil. If farming is carelessly done or improper equipment is used, the land surface will be roughened, making it difficult to irrigate. Two-way plows, tandem discs and other special equipment will help keep fields smooth. A farm float or plane to maintain a smooth surface will lessen the labor to irrigate.
Water distribution and drainage systems should be inspected before each irrigation season. Ditches will need to be cleaned of silt and vegetation. A V-type ditcher will be helpful to maintain the ditches. Weed control along the ditches will need attention regularly; otherwise, water channels can become a source of spreading weeds and reduce water flow.

As a farmer continues to make improvements in the farm, attention should be given to those improvements which will save labor and water, and prevent damage to the land.

Irrigation to be profitable requires good farm management. The moisture limitation can be removed by proper application of water. However, there are other factors which may keep the producer from receiving high production. A good manager will strive to maintain high fertility, good stand, good soil structure, select proper crop varieties, control weeds, insects, and diseases. He must maintain a good balance between crops and livestock and the total enterprises of his farm business.

The progressive farmer of today is a man of many skills, a diligent worker, and has a high degree of business management ability. He has a keen sense of awareness of God's gift of nature, the soil, the water, and the sun. He has pride in developing these resources as a good and faithful steward, mindful always of his obligation to the youth who are to follow in his steps; especially those who will till the soil for their way of life and provide food for others.