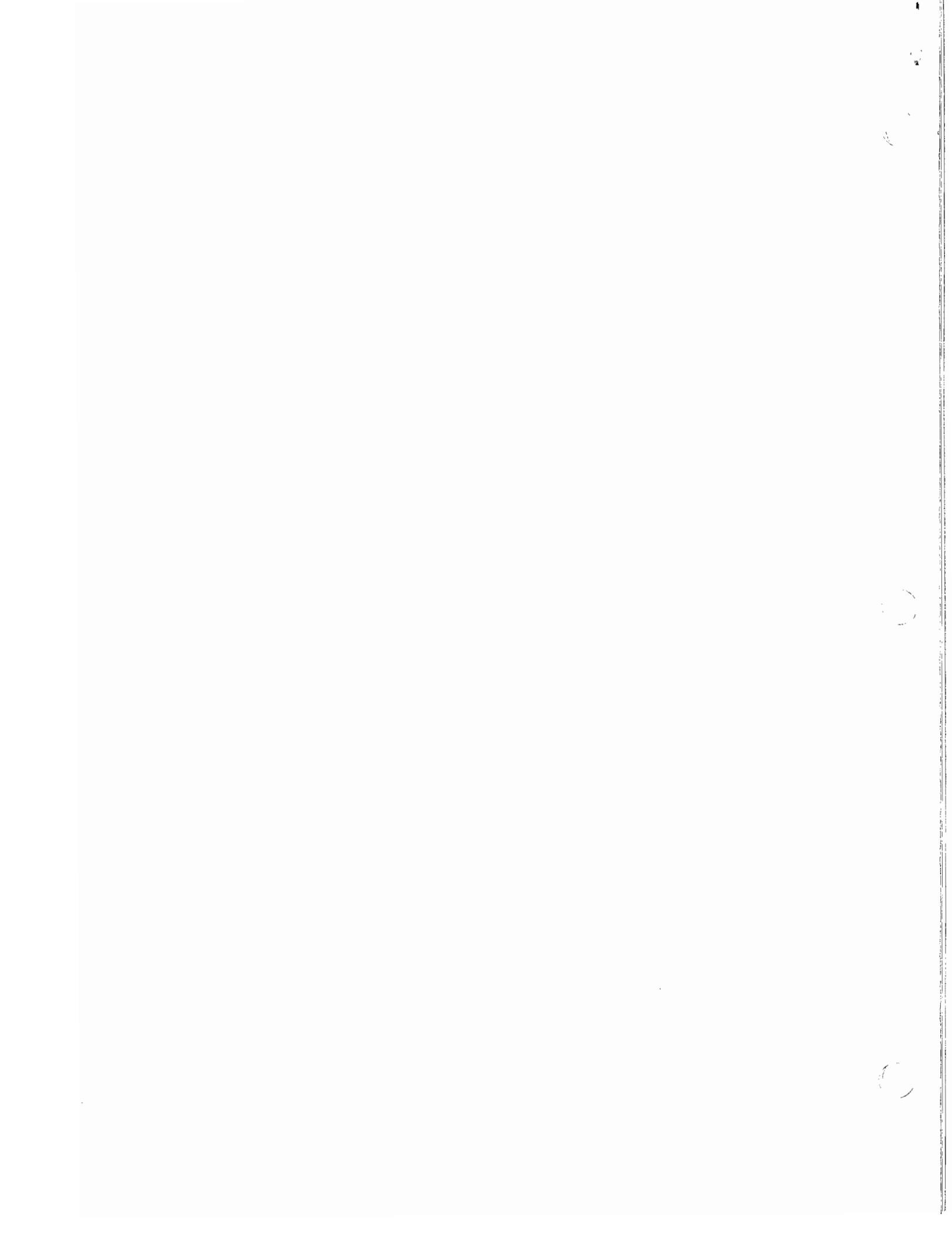


IWM

Conservation Irrigation Farm Plans



CONSERVATION IRRIGATION FARM PLAN

FOR: **JOE FARMER**
 Somewhere, Texas

BY: **USDA-NRCS**
 Your Soil Conservation District
 Fort Worth Field Office
 Fort Worth, Texas

DATE: **04-14-1987**

FIELD

This conservation irrigation plan is for irrigating the 124.3 acre field -2C

SOIL

*** This is an anywhere county soil ***

THE SOIL NAME IS: Lakeland Silt Loam

THE SURFACE SOIL TEXTURE IS: Silt Loam

SOIL IRRIGATION LIMITATIONS: None

*** AVAILABLE WATERHOLDING CAPACITY ***

	depth		in./ft.	cum. in.
0	to	1 Ft.	1.8	1.8
1	to	2 Ft.	1.8	3.6
2	to	3 Ft.	1.6	5.2
3	to	4 Ft.	1.6	6.8
4	to	5 Ft.	1.4	8.2

The water holding capacity of the 3 foot root zone is 5.2 inches. Normally you plan to irrigate when 1/2 of this amount or 2.6 inches has been used by the crop.

*** SOIL WATER INTAKE ***

The basic intake rate of this soil for surface irrigation is .5 inches per hour.

The maximum application rate for this soil under sprinkler irrigation is 2 inches per hour. An application rate greater than this may result in runoff.

Good conservation practices such as: No till, minimum till, residue management, and subsoiling all help to improve the waterholding capacity and the intake rate of the soil.

CROPS

*** GROWING SEASON ***

Crop	Plant Date	Harvest Date
CORN-grain	3-15	8-20
SOYBEANS	5-1	9-15

*** CRITICAL CROP GROWTH PERIODS ***

The most critical period normally occurs during the reproductive crop stage when pollination and fertilization occurs. Any crop subjected to extended periods of stress during germination, seedling, growth, reproductive or maturation stages will suffer yield loss and product quality loss. Good yields will be obtained only when sufficient water is available to the crop at all stages of plant growth.

WATER

*** CROP WATER REQUIREMENTS ***

Crop	Seasonal ET ----- Inches -----	Nor Irr Req	Peak Use Rate
CORN-grain	33.6	26.7	.37
SOYBEANS	29.4	20.9	.37

*** WATER REQUIREMENT ***

Your seasonal water requirement to apply a gross application of 35.6 inches (for a net of 26.7 inches) to 124.3 acres will be 368.8 acre feet per year at 75% efficiency.

*** SYSTEM CAPACITY ***

Your irrigation system needs a capacity of 1173 gal. per minute to meet the peak use rate of .37 inches per day at 75% efficiency, if you operate 24 hours per day.

You will need a system capacity of 1280 gal. per minute, if you operate only 22 hours per day.

NOTE: The irrigation system efficiency of 75% used in this plan means only 75% of the water applied to the field is available for the crop to use.

***** WATER SUPPLY *****

Your water supply is from a well. Your well has a capacity of 1250 gpm which is 30 gpm less than the peak period requirement of 1280 gpm of your crops.

Options include: Finding a supplemental supply, reducing the acres irrigated, raising a crop that requires less water, or manage for an inadequate irrigation supply.

IRRIGATION SYSTEM

***** CENTER PIVOT SPRINKLER *****

The 1275 ft. center pivot covering 360 degrees of a circle with an end gun (75 ft radius) operating 50% of the time will irrigate 124.3 acres.

The capacity of the center pivot irrigation system should be 1280 gpm to meet the peak use rate of .37 inches per day, if the system operates 22 hours per day at 75% efficiency.

The water supply capacity of your well is only 1250 gpm, therefore, the capacity of your irrigation system is limited to 1250 gpm. If the system is operated 24 hours per day it can supply a net of .3995887 inches per day.

The length of the center pivot from the pivot to the end nozzle is 1275 feet.

It will be equipped with impact nozzles and will operate at 60 psi at the pivot.

The minimum wetted diameter of the end nozzle should be 120.1 feet to meet the maximum application rate of 2 inches per hour.

PUMPING PLANT

***** PUMPING HEAD *****

The capacity of your pumping plant should be 1250 gpm to supply the capacity of your irrigation system. You will be pumping from a well.

The operating pressure of your center pivot sprinkler system is 60 psi or 138.6 feet of head.

To keep the velocity in the mainline below 5 feet per second the minimum pipeline diameter is 10.09252 inches. You selected a 10 inch diameter for your 1500 foot long pipeline.

PUMPING HEAD

	FEET	PSI
Pump Lift	120	51.9
Elevation Head	23	10.0
Friction Head Pipeline	10.7	4.6
Operating Head	138.6	60
Total Head	292.3	126.5

***** PUMP REQUIREMENTS *****

The capacity of your pumping plant should be 1250 gpm. It will be pumping from a well with a 120 foot lift, and a total pumping head of 292.3 feet.

***** POWER REQUIREMENTS *****

The horsepower requirement of the pumping plant with a drive efficiency of 100%, a pump efficiency of 75%, and a total pumping head of 292 feet is 123 horsepower.

***** ELECTRIC POWER PLANT *****

The energy consumption of the power plant will be 104.32 kwh per hour. It will take .36 hours and 37.5552 kwh to pump one acre inch of irrigation water.

It will take 4.32 hours and 453.792 kwh to pump one acre foot of irrigation water.

It will take 59.664 hours and 6224 kwh to apply a net application of one inch on 124.3 acres.

It will take 1604 hours and 167329.3 kwh per year to apply a net of 26.7 inches on 124.3 acres or 3318.81 acre inches.

OWNERSHIP AND OPERATING COSTS

*** INITIAL AND ANNUAL OWNERSHIP COSTS ***

(Using an interest rate of 9%)

ITEM	INITIAL COST	EXPECT LIFE -YEARS -	ANNUAL COST
Well	6500	25	662
Pump, including drive	4500	15	558
Electric power plant, comp.	5500	25	560
10 inch main pipeline	9000	25	916
Center pivot irrigation system	45000	15	5583
Taxes and Insurance			353
Total	70500		8632

*** ANNUAL OPERATING COST ***

(For a 1 inch net irrigation on 124.3 acres)

ITEM	AMOUNT	UNITS	COST/UNIT	TOTAL COST
Electric	6224	kwh	.055	\$342.32
Engine Oil	0.01	gal	5	0.03
Repair & Main Pump Plant	7344.639	bhp-hrs	.0005	3.67
Repair & Main Equipment	54000	dollars	0.5%	270.00
Labor	6.215	hours	5	31.08
Total (cost per net inch applied)				647.10

*** ANNUAL OWNERSHIP AND OPERATING COSTS ***

To irrigate 124.3 acres

Inches Per Year	Annual Ownership	Annual Operating	----- Annual ----- Total	----- Per Inch
3	8632	1941.302	10573.3	3524.43
6	8632	3882.603	12514.6	2085.77
9	8632	5823.905	14455.9	1606.21
12	8632	7765.206	16397.21	1366.43
15	8632	9706.508	18338.51	1222.57
18	8632	11647.81	20279.81	1126.66

USDA, NATURAL RESOURCES CONSERVATION SERVICE

CENTER PIVOT IRRIGATION SYSTEM SPECIFICATIONS

FOR: JOE FARMER, Somewhere, Texas

*** FIELD DIMENSIONS ***

Radius Irrigated (w/o end gun) -----	1275
Portion of a circle covered, degrees -----	360
Time the end gun will be on, percent -----	50
Radius (irrigated) of end gun, feet -----	75
Field size (irrigated), acres -----	124.3

*** CAPACITY ***

Needed daily application rate (net), In. per day -----	.37
Estimated system efficiency, percent -----	75
Planned operating time per day, hours -----	22
System capacity, gpm -----	1250

*** APPLICATION RATE ***

Recommended maximum application rate, inches per hour -----	2
Required wetted diameter of end nozzle, feet -----	120.1
Type of nozzle recommended -----	Impact

*** OPERATING PRESSURE ***

Operating pressure at pivot, psi -----	60
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CENTER PIVOT IRRIGATION SYSTEM SPECIFICATIONS

FOR: JOE FARMER, Somewhere, Texas

*** PUMPING HEAD ***

	FEET	PSI
Pump Lift	120	51.9
Elevation Head	23	10.0
Friction Head, Mainline	10.7	4.6
Operating Head	138.6	60
Total Head	292.3	126.5

Note: Pumping from a well with a 120 foot lift using a 10 inch diameter, 1500 foot long mainline.

*** PUMPING PLANT ***

Pumping plant capacity, gpm -----	1250
Total pumping head, feet -----	292.3
Energy requirement, whp -----	92.3
Estimated direct pump drive efficiency, percent -----	100
Estimated pump efficiency, percent -----	75
For a pumping plant efficiency of, percent -----	75
Power requirement, horsepower -----	123.1

*** ELECTRIC POWER PLANT ***

Power requirement, horsepower -----	123.1
Energy consumption, kwh per hour -----	104.32
Operating time per acre inch, hours -----	.36
Annual operating time, hours -----	1604
Annual energy consumption, kwh per year -----	167329.3
For a 35.6 inch gross application	