Buy 4 Build 2 Lanes Acquisition Policy

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Economic analysis of advance 4-lane right of way acquisition

ECONOMIC ANALYSIS OF ADVANCE
4-LANE RIGHT OF WAY ACQUISITION

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October 8, 1974

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October 8, 1974

SCOPE OF REPORT

This study's purpose is to analyze the land cost per acre incurred by the public in the advance purchase of 4-lane Right of Way when only 2-lane Right of Way is initially required. The holding period for the study is assumed to be from 5 to 20 years. The past and projected increase in Iowa farmland prices are then discussed as well as considerations regarding the economic and social costs of 4-lane advance acquisition. Finally, conclusions suggesting policy changes are made.

ASSUMPTIONS AND LIMITING CONDITIONS

This report may contain inadvertent omissions and only contains rough estimates in some areas where extensive research would be required. We believe the data in most cases to be reasonable approximations of actual costs. The main thrust of the report is derived with a high degree of accuracy. The conclusions, therefore, we believe will be sound.

The money saved by the State in only having one land acquisition instead of two is not considered. History has shown that when the second set of lanes are constructed at a later date, additional acquisitions are required for obtaining borrow and for additional Right of Way needs to meet ever changing design standards. Also not considered is the administrative cost of managing this additional property until construction or the cost to the State of disposing of the surplus land if the additional Right of Way is not needed.

The conclusions have particular pertinence to rural sections where 2-lane Right of Way acquisition with access control would eliminate the necessity to purchase improvements adjacent to the Right of Way if a 4-lane facility

is needed. Therefore, it is assumed that there would be no monetary savings to the State from buying fewer improvements on an advance 4-lane Right of Way purchase.

DIRECT ECONOMIC COSTS OF HOLDING ADDITIONAL RIGHT OF WAY FOR 5, 10, 15 and 20 YEARS

The approach to determining the holding cost is based on an alternative safe investment, such as government securities which will grow at a compounded rate. When the State invests money in land it should expect a return exceeding the rate of return on a safe investment, such as bank time deposits, or government insured treasury bills. Therefore, the compounded return or an alternative safe investment is a proper land holding cost. The annual costs of maintenance, the lost revenue must also be compounded at the same rate to determine the cost of holding excess land.

I. Initial Costs $1,400

A. Land acquired at an assumed price of $1,000 per acre

B. Stabilization control measures - $150 per acre(1)

C. Over-seeding, fertilization, mowing - $250 per acre(2)

II. Interest Rate - 8½%(3)

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(1) Current costs from Duane Hockett, Roadside Development.

(2) Current costs ranged from $175 per acre to $350 per acre in Lee County, Duane Hockett.

(3) Ten year government securities currently earn 8½%, higher short term interest rates are currently accruing on highway commission funds (10-12%), Maurice Barringer, State Treasurer. The 8½% yield is a safe rate of return on long term investments.

III. Determination of the Initial Cost Compounded at 8½%

	Compound Interest Factors[4]		Initial Cost Per Acre		Compounded Initial Cost
A. 5 years =	1.504	x	$1,400/acre	=	$2,105/acre
B. 10 years =	2.261	x	$1,400/acre	=	$3,165/acre
C. 15 years =	3.400	x	$1,400/acre	=	$4,760/acre
D. 20 years =	5.112	x	$1,400/acre	=	$7,157/acre

IV. Annual Recurrent Costs to the Public . . . . . $ 53.60

A. Maintenance (roadside and drainage) $14.00 per acre[5]

B. Reduction in property taxes $15.00 per acre[6]

C. Reduction in State and Federal income tax $24.60 per acre[7]

D. Reduction in State sales tax[8]

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(4) $S^n = (1+i)^n$ - This factor is commonly known as the "Future worth of one dollar with interest."

(5) Jack Percival, Maintenance Department (see attach).

(6) Department of Revenue reports 95.648 to be average millage rate, $334 average actual value, $90.42 per acre tax value. The $90.42 per acre tax value is adjusted by miltiplying by 1.73 to indicate $1,000 per acre land. The indicated tax value for $1,000 per acre land is $156 per acre x 95.648 mills = approximately $15 per acre.

(7) 1973 average farm income was $16,539., average farm size 247.0 acres, Iowa agricultural statistical reporting service, 1974. The Federal tax was computed by assuming 3 dependents and standard deduction. Iowa income tax was reported by Iowa Department of Revenue.

(8) Not estimated.

V. Determination of Annual Cost Compounded at 8½%

	Term	Compound Interest Factor(9)		Annual Cost		Total Compounded Annual Costs
A.	5 years	5.925	x	$ 53.60	=	$ 318/acre
B.	10 years	14.835	x	$ 53.60	=	$ 795/acre
C.	15 years	28.232	x	$ 53.60	=	$1,513/acre
D.	20 years	48.377	x	$ 53.60	=	$2,593/acre

VI. Determination of Total Holding Costs

	Term	Compounded Initial Cost		Compounded Periodic Cost		Total Holding Cost
A.	5 years	$2,105/acre	+	$ 318/acre	=	$2,423/acre
B.	10 years	$3,165/acre	+	$ 795/acre	=	$3,960/acre
C.	15 years	$4,760/acre	+	$1,513/acre	=	$6,273/acre
D.	20 years	$7,157/acre	+	$2,593/acre	=	$9,750/acre

VII. Determination of Required Appreciation to Equal Total Holding Costs

	Term	Total Holding Costs		Initial Land Cost		Compound Interest Factor		Required Appreciation
A.	5 years	$2,423/acre	÷	$1,000/acre	=	2.423	=	20%
B.	10 years	$3,960/acre	÷	$1,000/acre	=	3.960	=	15%
C.	15 years	$6,273/acre	÷	$1,000/acre	=	6.273	=	13%
D.	20 years	$9,750/acre	÷	$1,000/acre	=	9.750	=	12%

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(9) $S_{\overline{n}|i} = \frac{S^n - 1}{i}$ - The total accumulation of principal and interest of series of deposits or installments of one per period for a given number of periods with interest at the effective rate per period.

DIRECT ECONOMIC HOLDINGS COSTS FOR 5-20 YEARS ASSUMING ACQUISITION COST OF LAND AT $580 PER ACRE (1973 STATE AVERAGE VALUE)

I. Initial Costs $ 980

A. Land acquired at $580 per acre which is the 1973 State average according to ISU survey.

B. Stabilization control measures - $150 per acre.

C. Over-seeding, fertilization and mowing - $250 per acre.

II. Interest Rate 8½%

III. Determination of the Initial Cost Compounded at 8½%

	Term	Compound Interest Factors		Initial Cost Per Acre		Compounded Initial Cost
A.	5 years	1.504	x	$ 980/acre	=	$1,474/acre
B.	10 years	2.261	x	$ 980/acre	=	$2,216/acre
C.	15 years	3.400	x	$ 980/acre	=	$3,332/acre
D.	20 years	5.112	x	$ 980/acre	=	$5,010/acre

IV. Annual Recurrent Costs to the Public $ 33.50/acre

A. Maintenance (roadside and drainage) $14.00 per acre

B. Reduction in property taxes $ 9.00 per acre

C. Reduction in State and Federal income tax $10.50 per acre

D. Reduction in sales tax not estimated

V. Determination of Annual Costs Compounded at 8½%

	Term	Compound Interest Factors		Annual Cost		Total Compounded Annual Costs
A.	5 years	5.925	x $	33.50/acre	= $	198/acre
B.	10 years	14.835	x $	33.50/acre	= $	497/acre
C.	15 years	28.232	x $	33.50/acre	= $	946/acre
D.	20 years	48.377	x $	33.50/acre	=	$1,621/acre

VI. Determination of Total Holding Costs

	Term	Compounded Initial Cost		Compounded Periodic Cost		Total Holding Cost
A.	5 years	$1,474/acre	+ $	198/acre	=	$1,672/acre
B.	10 years	$2,216/acre	+ $	497/acre	=	$2,713/acre
C.	15 years	$3,332/acre	+ $	946/acre	=	$4,278/acre
D.	20 years	$5,010/acre	+	$1,621/acre	=	$6,631/acre

VII. Determination of Required Appreciation to Equal Total Holding Costs

	Term	Total Holding Costs		Initial Land Cost		Compound Interest Factor		Required Appreciation
A.	5 years	$1,672/acre	÷ $	580/acre	=	2.883	=	23½%
B.	10 years	$2,713/acre	÷ $	580/acre	=	4.678	=	16½%
C.	15 years	$4,278/acre	÷ $	580/acre	=	7.376	=	14½%
D.	20 years	$6,631/acre	÷ $	580/acre	=	11.433	=	13%

STATE OF IOWA INVESTING IN FARMLAND

The history of Iowa farmland prices has not always been upward. In 1900 the average price of farmland in Iowa was $43 per acre, by 1920 it had climbed to a peak of $255 per acre only to tumble during the farm recession to $88 per acre by 1940. Since 1940 farmland has increased steadily to $579 per acre in 1973. During the past 20 years (1953-1973) farmland has increased upwardly an average of 5½% a year. The past 15 years (1958-1973) an average increase of 6¼% a year has resulted. The past 10 years and 5 years have shown average yearly increases of 8% and 8-3/4% respectively. The above information was based on the annual Iowa State University survey of real estate brokers conducted by economist Dr. William Murray. The prospects of future land increases at present rates over the next 20 years is dependent on continued inflation without another depression, continued higher grain and livestock prices, an increase in technology to produce greater grain yields and more efficient farming practices, favorable land contracts and continued world food shortages. Most economists predict an optimistic outlook in the short run (next 3 to 5 years) for the agriculture economy. However, double digit inflation, poor livestock prices, and poor 1974 crops has slowed demand and has curtailed land price increases in many parts of Iowa.

The price that land sells for has been defined as the present worth of the buyers expectation of all future benefits to be derived from that land. When a farmer, or an investor buys farmland there are two future benefits. These are net income and appreciation. Net income is the yearly gain from

the selling of grain and livestock over expenses. Appreciation is the increase in the market value of land over a given period of time. The State Highway Commission not being in the farm management business does not actively lease out the unused 4-land Right of Way. In fact less than 5% of this land is leased out except on Highways 163 between Des Moines and Pella and Highway 21 near Waterloo(10). The average acre of cropland leases for $30 per acre which is 25 to 50% below going rates due to the irregular shape, smallness of the tracts and the inaccessibility. Leasing is initiated by a request from the property owner which then must be acted on by the District Engineer, Road Design, Roadside Development, Programming and Scheduling, and Facilities Management. Roadside Development often recommends not leasing the land due to the investment in erosion control measures and seedings. The size of the tracts leased are often 5 to 10 acres. The income of $150 to $300 per lease when only 5% of the excess land is leased would appear to not cover the cost of managing 100% of the surplus Right of Way. The State then doesn't gain the net income provided the typical farmland investor but incurs holding costs of erosion stabilization, fertilization, seeding, roadside maintenance and lost tax revenue.

The State may gain appreciation in the value of the land. The appreciation in land over the past 20 years was only 5½% but was 8-3/4% in the last 5 years. If land in the future gains 10% per year, it will not be enough to cover the

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(10) Leasing of Right of Way information obtained from Eldon Cabbage, Property Management Section.

compounded holding costs. The holding costs[11] are approximately 20% per year for 5 years, 15% per year for 10 years, 13% per year for 15 years and 12% per year for 20 years. The holding costs are greater for the first five years due to the high initial cost of the stabilization control and seeding.

ECONOMIC AND SOCIAL CONSIDERATIONS

The taking of excess land for future use is removing land from agricultural food production prematurely. This was in the national economic interest in the sixties and early seventies when feed grain surpluses abounded and government soil banks and diverted acres prevailed. The country is now not only without surplus feed grains but is without adequate reserves. There have been proposals by leading economists suggesting an international grain bank both to stabilize prices and exert a downward pressure on inflation[12]. The world population growth each year warrants a 3% increase in agricultural production to keep pace with demand. In 1973 food production, due to a series of world wide crop and fish shortages, supplies were down 3%. This 6% gap between supply and demand coupled with increased world wide purchasing power caused tremendous price escalations. Here in the midwest soybeans, a major source of protein and oil became of national importance and renewed research on increasing yields were begun. There have been few technological advances to increase crop yields in the past five years compared to the advances in the last 20 years. Also fertilizer supplies are low

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(11) Holding costs are defined as the initial and recurrent annual costs compounded at 8½%. The costs are compounded at 8½% to reflect the cost to the State of tying up State money in land. The 20% per year for 5 years is the combined effect of the initial and recurrent costs.

(12) Economic Summit on Inflation, 1974.

and highly expensive which discourages optimum high yields. Agricultural Secretary, Earl Butz, has asked farmers to produce more to meet world needs. In this atmosphere advance purchase of Right of Way is counter productive. Although it is noteworthy that the amount of farmland taken for highways each year is minimal, what is significant is that the country needs greater production and until scientists increase yields and fertilizer supplies increase, more intensive farming of available land will be a national priority.

Prior to the 70's when farmers had marginal incomes from corn and soybeans, the idea of purchasing additional land was acceptable when it was our intention to build the other two lanes in the near future. The farmer now with net incomes as high as $200 per acre is reluctant to part with cropland and doesn't accept the notion the other 2-lanes will ever be built(13). The energy shortage and resulting speed limit reduction makes a 4-land highway construction suspect to a property owner's common sense(14). The property owner would rather have the State purchase only for current needs. The Highway Commission policy of 4-lane advance purchase has considered the importance of disturbing property owners only once. History however does not support this philosophy. There seems to be perpetual design specification changes that make the purchased Right of Way inadequate for future needs; e.g., Iowa Highway 13, U.S. Highway 20 and U.S. Highway 30.

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(13) Seventeen projects have been 4-lane Right of Way advance purchased, only 2 projects have been completely constructed.

(14) Interviews with 25 property owners along Freeway 592, Marion County.

The need for a different route may be desirable in the future that would cause the additional Right of Way to be declared surplus; e.g., Iowa Highway 21 and 163.

Property owners can better understand and accept additional acquisition as opposed to acquiring and removing land from production with the possible future need for still additional land.

The tone of the 70's; i.e., energy crisis, reversal of the population shift from rural to urban areas, reduction in State gas revenue, a renewed interest in rail transport, and others may warrant flexibility[15] in design, route selection and scheduling of highway projects. The advance 4-lane Right of Way purchase when only 2-lane construction is justified tends to commit the Highway Commission to a highway system without the necessary flexibility.

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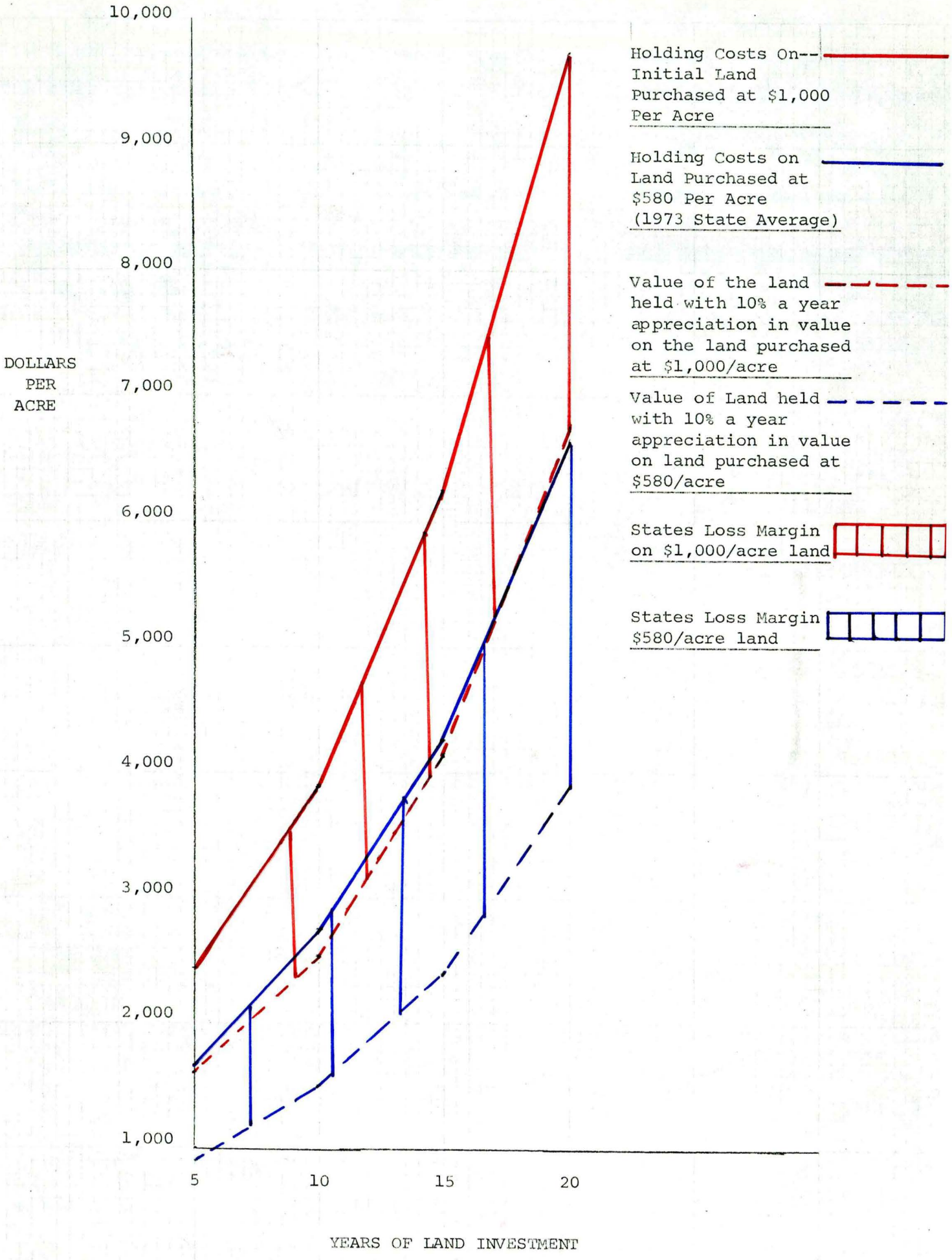
(15) "Flexibility is the Keyword" was J. R. Coupal's, then Highway Director, response to the highway building outlook burdened by a gas shortage, January, 1974.


10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
DOLLARS PER ACRE
5
10
15
20
YEARS OF LAND INVESTMENT
Holding Costs On-- Initial Land Purchased at $1,000 Per Acre
Holding Costs on Land Purchased at $580 Per Acre (1973 State Average)
Value of the land held with 10% a year appreciation in value on the land purchased at $1,000/acre
Value of Land held with 10% a year appreciation in value on land purchased at $580/acre
States Loss Margin on $1,000/acre land
States Loss Margin $580/acre land

Land values double in 8 years

by Bob Pritchard
Assistant extension editor
Iowa State University

HIGHER land price last year was no real surprise. But the way it zoomed was.

The one-year increase in farm land values eclipsed anything in Iowa land price history. The dollar increase per acre of average farm land in 1973 nearly equaled the average selling price of land in 1945. Average value has doubled in just 8 years.

An Iowa State University survey of 504 real estate brokers on Nov. 1 concluded that the average price of all farm land in the state totaled an all time high of $579 per acre, up a record $139—about 32%—from 1972.

Farm realtors cited these reasons: Higher grain and livestock prices, expanding farm operations, more nonfarm investors, more contract buying, and inflation.

In announcing the findings, ISU economists William Murray and Larry Walker noted northern and central Iowa experienced the greatest rise in land values. Top grade land now averages $977 per acre in the central Iowa crop reporting district, $925 in the north central district, $895 in the east central district, and $894 in the northwest. Prices rose the slowest in the southwestern district.

It didn't make much difference this past year what kind of farm real estate was being traded. The jump in value of nearly a third occurred uniformly for high, medium, and low grade land. The average value of all high grade land was estimated at $802 per acre—up $195 from 1972; medium grade land at $563—up $133—and low grade at $368—up $89.

The 31.6% average increase compares with the 11% price increase in 1972 and 2.6% in 1971. The table below traces the rise over the past 10 years.

The most frequently mentioned influence for the price rise was farm commodity prices. Nearly 62% of the brokers surveyed cited this factor.

USDA figures support the brokers' claim. Corn prices averaged $1.21 per bushel in 1971, $1.11 in 1972, and $1.76 in the first 11 months of 1973. Yields were estimated at 102, 116, and 109 bushels per acre during the respective periods.

Average soybean prices went from $2.90 to $3.29 to $6.58 in the last 3 years. Yields varied from 32.5 to 36 to an estimated 35 bushels per acre in the respective years according to USDA statistics.

On the livestock side of the ledger, the economists point out USDA steer and heifer average prices went from $31.50 per cwt. in 1971 to $35.30 in 1972 and $45.38 during the first 11 months of 1973. Hog prices bounded from $17.50 per cwt. 3 years ago to $25.30 in 1972 to $39.52 during the first 11 months of 1973.

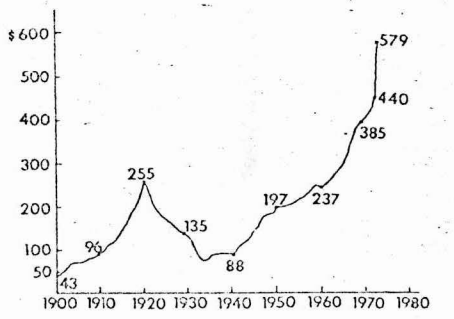
Second most frequently mentioned influence on land prices in the survey was farm expansion. Nearly 54% of the brokers cited this factor. Enlargement had been the most frequently mentioned factor for land price increases in recent years.

The 3rd ranked influence on land prices came from nonfarm investors. More than a quarter of the brokers noted this influence in 1973, twice the number mentioning outside investors in 1972 and 4 times the number in 1971.

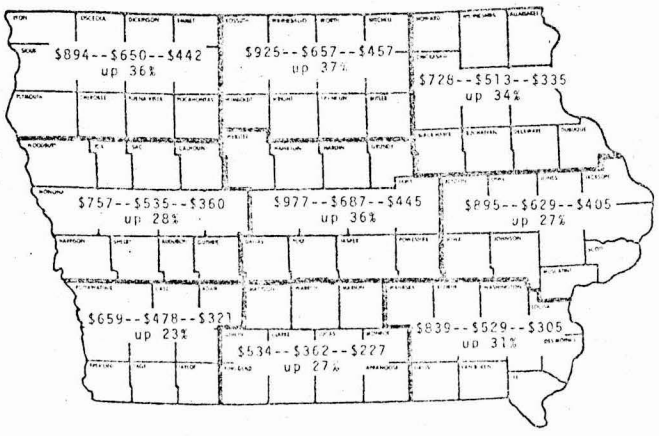
Finally, contract purchasing and inflation were each mentioned by 12% of the brokers as prevalent causes for the land price increase.

Value of average Iowa farm land

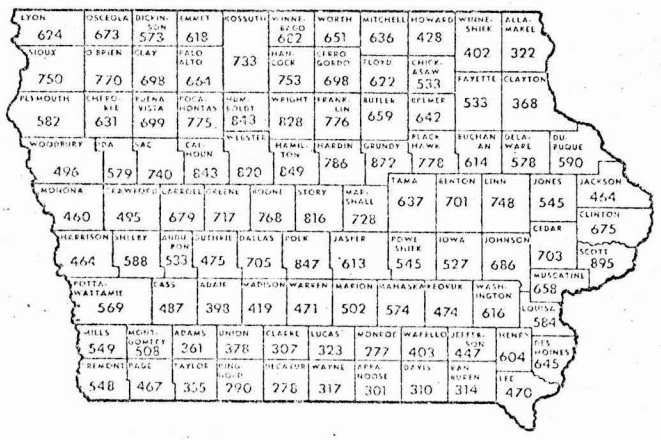
Year	Price per acre	Annual increase	
1963	$250	$ 9	3.7%
1964	265	15	6.0
1965	293	28	10.6
1966	331	38	13.0
1967	362	31	9.4
1968	375	13	3.6
1969	382	7	1.9
1970	385	3	.8
1971	395	10	2.6
1972	440	45	11.4
1973	579	139	31.6



Average value per acre of Iowa farm land and buildings.



Average per acre values for high, medium, and low grade farm land on Nov. 1, and average percent increases from 1972 by crop reporting districts.



Dollar value per acre for average farm land based on Iowa State University Nov. 1 survey of real estate brokers and 1969 Census of US Agriculture.

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IOWA STATE HIGHWAY COMMISSION

o Dept. Right of Way Department

Date October 4, 1974

ttention Bill Lounsbury

REFER TO: 604

rom Jack L. Percival

ept. Maintenance Department

ıbject Maintenance Costs for Highway Right of Way

As per your request we have tabulated maintenance costs for five sections of two-lane highways built on four-lane right of way. The maintenance costs were compared with those on two-lane highways built on two-lane right of way.

There appears to be some difference between Maintenance costs on two-lane highways built with two-lane and four-lane right of way, amounting to about $260.00/mile for all operations and $160 per mile for right of way maintenance.

Attached you will find a summary of the costs and controls sections used.

JLP:crg
Attachment