THE EFFECT OF RIGHT OF WAY ACQUISITION ON FARM AND RANCH OPERATING UNITS

Summary Analysis of Three Study Areas

By

Hugo G. Meuth
Assistant Research Economist

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The opinions, findings and conclusions expressed in this publication are those of the author and not necessarily those of the Texas Highway Department or the Federal Highway Administration.

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Abstract

This report summarizes the effects of controlled access highways on selected farm and ranch operators in three types of agricultural areas in Texas. The first area selected for study is located along Interstate 45 in Madison County and represents an area of small ranches. Results of the study were published in Research Reports 58-4 and 58-4(S). The second study area is located along Interstate 35E in Ellis County and represents an intensive farming area. Results of this study were published in Research Reports 58-5 and 58-5(S). The third area is located along Interstate 10 in Colorado and Fayette Counties and was selected to represent a diversified farming area. Results of this study were published in Research Reports 58-6 and 58-6(S).

Information for the studies was gathered by personal interview from operators in the study area along the new highway and also from operators located in an area nearby but outside of direct highway influence. These latter operators served as a control group. Information was obtained from both study and control area operators covering the periods "before", "during", and "after" the construction of the new facility.

The objectives of the studies were to determine the effects of right of way acquisition on the changes in kind and intensity of land use, changes in number of farm units, tenure and scope of operations. Other objectives dealt with the cost of adjustments to new farm operating conditions and changes in farm income caused by decreasing farm acreage and division of units into separate tracts.

The Madison County study is based on information gathered from 15 study and 16 control area livestock operators. The Ellis County study is based on information gathered from 39 study area and 39 control area operators engaged in intensive farming practices. In the Colorado-Fayette County study the analyses of farm operations were based on data gathered from 21 study and 19 control area operators.

In the three areas it was found that the taking of right of way for controlled access highways had short term effects on farm and ranch operations, but after a few years to allow for adjustments, the operators as a whole made noticeable gains in agricultural production and average net income. No major changes in land use or tenure could be attributed to the highway. Also, travel patterns of the local operators were changed very little by the limited access type highways.

Summary

This report summarizes the effects of controlled access highways on selected farm operators in three types of agricultural areas in Texas. Based on data collected from study and control area operators in each area, it appears that generally the study area operators experienced minor set-backs in their operations and average income during the period immediately following right of way acquisition. This is particularly true of small operators who had only a single right of way tract as their entire operation. After two to three years, however, study area operators, through adjustments and improved farming or ranching practices, were able to show substantial gains in agricultural production and average net income. The acquisition of right of way had little effect on land tenure except that in some cases owner-operators sold off small remainders and renter-operators occasionally released small remainder tracts that were no longer economical to operate. Owner-operators of right of way tracts reported that they used about 14% of the money received for land acquired for right of way to improve or intensify the use of their land. Most operators in the studies had multiple tract operations and experienced minor changes in land use and size of remainder tracts. However, such effects tend to be obscured by the fact that right of way tract acreage represented only a portion of their total operations. There was evidence of increased land values along the highways; also, about 25 percent

of the land-owners benefited from sale of sod, fill dirt or rock and the lakes formed by these excavations. Overall it appears that the operators in the three areas in Texas were benefited more than they were harmed.

Implementation Statement

Since the Texas Highway Department is responsible for appraising and acquiring right of way, it is in the best interest of the Department to understand better the probable effects of right of way acquisition on farm and ranch operations. Increased knowledge of values, potential damages and economic consequences should permit more thorough appraisals for right of way purposes and should also be of assistance in right of way negotiations and highway location.

The study should be of particular interest to negotiators and appraisers, as it provides information regarding agricultural operations on remaining right of way tracts and the adjustments that operators make after highways cut through their land. This information should enable the negotiators to act with more assurance when acquiring agricultural land for right of way.

An effort has been made to analyze and organize the findings in a manner that will facilitate application to right of way problems.

Introduction

The study areas were selected to depict three different types of agricultural operations in Texas. It was anticipated that the taking of right of way would affect farm operations differently based on the varied agricultural practices.

The first area selected for study is located along Interstate 45 in Madison County and represents an area of small ranches. The area is approximately 18 miles in length, extending north and south through the county. Madison County is located about 100 miles north of Houston.

The second area selected for study is located along Interstate 35 E in Ellis County and represents an intensive farming area. The area is approximately 20 miles in length extending from about one mile south of Waxahachie to the Ellis-Hill County line. Waxahachie is located about 30 miles south of Dallas.

The third area is along a 10-mile section of Interstate 10 in Colorado and Fayette Counties, located about equidistant from Houston and San Antonio, and was selected to represent a diversified farming area.

In order to account for any external or general influences not attributable to the highway during the study periods, similar

farm management data were collected from operators in control areas that were similar to study areas in the "before" period. Information was gathered by personal interviews from the study and control operators covering their total farming and ranching operations for the years representing the "before", "during" and "after" construction periods.

Problem

The taking of land for right of way purposes may affect farm and ranch operations in a number of ways. Naturally, it reduces the size of the individual tract affected. The tract might represent an entire operation or it might represent only a small part of a multi-tract operation. Also, a right of way taking may divide the original property in such a manner that the effective operating size of a unit is reduced by an amount greater than the portion taken. It may be necessary for some operators to exchange rented property or to sell or buy other tracts in order to reconstitute units suitable for their operations.

The extra capital from the sale of right of way land may stimulate an operator to increase production through a more efficient operation. A new highway may also cause a change in the highest and best use of the land, thus changing its overall value. In other cases, the value of land may be greatly enhanced by the highway, without the land moving up the scale of land classifications.

Objectives

The major objectives emphasized in this study are to determine the effects of right of way acquisition upon:

1. Changes in kind and intensity of rural land use;
2. Changes in the number of farm and ranch units, tenure and intensity of operations;
3. Cost of adjustments to new farm operating conditions; and
4. Changes in farm income caused by decreased farm acreage and division of units into separate tracts.

General Description of the Three Study Areas

The Madison County Area consisted primarily of livestock operations. The area is located in the Post Oak belt of Texas, which has sandy loam soil that is very desirable for grazing cattle. In its natural state, much of the area was covered with timber; however, considerable quantities of the land have been cleared and planted in improved grasses. In the past 20 years operators have shifted from a combination of cash crop and livestock farming to strictly cattle operations. The operations in the area can be classified as cow-calf enterprises which involve a foundation herd of cows to produce calves that are generally sold at six to eight months of age.

The Ellis County area is considered excellent farmland as it lies in the Blackland Belt of Texas. About 75 percent of the area is deep black soil, the major portion of which is in cultivation. Most of the farms are not fenced, indicating the practice of intensive cropping. The two major cash crops grown in the area are cotton and grain sorghum with much of the cropland being farmed by renter-operators. The other 25 percent of the area is composed of either shallow soil or creek bottoms subject to overflow. Much of this land is fenced and used as pastureland. Operators were gradually adding cattle to their operations and becoming more diversified.

The Colorado-Fayette County area represents a diversified farming area consisting of family-type farms. The operations are generally small, with a definite trend away from cash crops to hay and grain for use in the operators' own livestock enterprises such as beef, dairy, swine and poultry. Beef cattle are rapidly becoming more important to the operators as they divert their cropland to pastureland for grazing.

Right of Way Tracts in Relation to Total Operations

Total farm operations as well as right of way tracts, were studied in order to determine the overall importance of right of way takings to study area farm operations. Table 1 shows the significance of right of way takings to right of way tracts and the relationship of both takings and right of way tracts to total operations in each of the three areas.

Table 1

Size of Right of Way Takings Related to Individual Tracts and Total Operations Of Operators in Each of the Three Study Areas[1]

Item	Madison County Area	Ellis County Area	Colorado-Fayette County Area	Totals
Number of Operators	23	39	21	83
Total Operation Before Taking				
Number of Tracts	56	143	50	249
Number of Acres	18,530	23,989	5,087	47,606
Right of Way Tracts				
Tracts				
Number	29	55	22	106
Percent of Total	52	39	42	43
Acres				
Number	10,493	8,488	3,090	22,071
Percent of Total	57	35	61	46
Right of Way Takings				
Acres Acquired	683	774	375	1,832
Percent of ROW acres	6.5	9.1	12.1	8.3
Percent of Total acres	3.7	3.2	7.4	3.8

[1] Includes the tracts of operators that furnished complete operation data for all three years plus those operators that supplied partial information.

In the Madison County area the 23 operations varied in size from 81 acres for the smallest to an operation using six tracts containing 3,985 acres. There were 29 right of way tracts that averaged 362 acres in size and represented 52 percent of all tracts. The 29 tracts contained 57 percent of the total acreage of study area operators at the time the highway was routed through the area. The 683 acres acquired for right of way represented 6.5 percent of acreage in all the right of way tracts and 3.7 percent of total land in the 23 operations. After the highway was located, there were 54 remainder tracts averaging 182 acres each. Twenty-four of the 29 original tracts were divided, each forming two or more tracts, and the other five original tracts experienced takings only at their boundaries. Of the 23 operators of right of way tracts, 21 were owners of the tracts and two were renters. In most cases the amount of land acquired from an operator was a rather small percentage of his total operation. But, for individual tracts, the right of way taking frequently reduced the usable acreage for ranching more than the actual loss of acreage might indicate. In the subject cases, operators with small remainder tracts of 15 acres or less not contiguous to any of their other operations found it uneconomical to fence and use the small remainder. Some of the small tracts have been sold, but five others were still idle at the end of the study.

In the Ellis County area, 39 operators furnished general information regarding right of way takings in relation to 55 right of way tracts and to 143 tracts containing 23,989 acres in their total operations. The operations ranged in size from a one tract operation containing 69 acres to a 14 tract operation containing 3,167 acres. The right of way tracts contained 35 percent of the total acreage operated at the time of right of way acquisition.

Twenty-eight of the Ellis County study area farmers had only one tract each affected by right of way acquisition. For 10 of these operators, the right of way tract represented the total operation. Eleven operators had more than one tract affected by the highway. The 774 acres acquired for right of way for Interstate 35 E represented 9.1 percent of the acreage in the right of way tracts and 3.2 percent of the acreage in the total study area operations.

The 55 tracts affected by the highway ranged in size from 25 to 741 acres with the average size tract being 154 acres before right of way taking. After the taking, the 55 tracts were formed into 100 separate tracts ranging in size from less than one acre to 511 acres with the average size being 85 acres.

The Colorado-Fayette County study was based on data gathered from 21 study area operations with 22 tracts containing 3,090 acres affected by right of way acquisition. There were 19 control operators. Operators in this area, having somewhat smaller farm operations than those in the Madison or Ellis County studies, had a larger percentage of their land acquired

for right of way. The 22 right of way tracts represented 42 percent of all tracts operated but contained 61 percent of the total acreage operated. The right of way tracts were most often "main" tracts, and about two-thirds of the right of way tracts contained the headquarters of the operators. Right of way tracts ranged from 41 to 480 acres in size and averaged 140 acres. Right of way takings totaled 375 acres and created 35 remainders averaging 78 acres and with a range in size from 1 to 304 acres. Acreage acquired represented 7.4 percent of the acreage in total operations and 12.1 percent of the acreage in the right of way tracts. Right of way tracts constituted the total acreage of eight operators. Operators of these tracts lost an average of 9.7 percent of their land to right of way with the range of takings being from 1.6 percent to 26.5 percent. The 13 operators of multiple tracts lost from a low of 3.6 percent to a high of 13.7 of their total acreage to right of way takings.

Payments Received for Land and Improvements and Disposition of Money

Table 2 shows the reported disposition of right of way payments received by the landowners in the three study areas.

In the Madison County area, owner-operators averaged about $8,340 in right of way payments for land, damages, improvements, and easements. About 55 percent of the money received was for 683 acres of land acquired. The other 45 percent was for damages, improvements and easements. The 21 owner-operators placed 39 percent of their payments in savings. Another 19

Table 2

Ways in Which Landowners Used Money Received for Right of Way in Each of the Study Areas

Items	Madison County Area Percent of		Ellis County Area Percent of		Colorado County Area Percent of	
	Operators	Money spent	Operators	Money spent	Operators	Money spent
Owner-Operators						
Improve land						
Agricultural Purpose	48	19	45	8	42	9
Commercial Purpose	2	5	0	0	0	0
Construct Buildings and Corrals						
Severed Tracts	29	3	35	3	17	1
Other Tracts	5	1	5	+	0	0
Purchased Livestock	5	+	0	0	0	0
Purchased Land	10	11	15	7	0	0
Fencing ROW Tract	95	8	65	4	100	7
Improve or Construct Home	9	6	50	23	25	10
Water Supply	19	1	25	3	33	3
Improve Cash Position	62	39	65	38	75	41
Purchase Equipment	0	0	10	3	17	2
Paid on Land Note	9	4	30	10	25	19
Cattle Passes	9	3	0	0	0	0
Miscellaneous	0	0	30	2	17	5
Total owner-operators and money received	21	$175,188	20	$242,294	13	$57,392
By Landlords of Rented Tracts[2]						
Fencing ROW Tracts			41	2	100	6
Improve Land			3	1	0	0
Water Supply severed tracts			0	0	44	3
Improve renters home			6	1	0	0
Money not used on ROW Tracts[1]			100	96	100	91
Total land-lords of renter-operators and money received			32	$255,798	9	$85,279

[1]According to reports of renters

[2]Information was not obtained on money received by landlords in Madison County Area.

percent was spent on pasture improvements and a little over 15 percent was spent by the operators in making adjustments on right of way tracts. These latter included such things as constructing right of way fencing, corrals, water supply, cattle passes, and small barns and or sheds on the severed tracts. No information was obtained on money received by landlords in the Madison County Area.

In the Ellis County Area, right of way required 774 acres of land or an average of about 14 acres from the 55 tracts. The 20 owner-operators received an average of $7,994 for right of way. They placed 38 percent of their payments into savings accounts. Twenty-three percent was spent on new or old home improvements. Only 18 percent was used in making adjustments on right of way tracts or improving their land. On the other hand, the owners of rented tracts used about 96 percent of their receipts on various investments other than their farmland involved in this study.

In the Colorado-Fayette County study 13 owner-operators received an average of $4,415 in right of way payments. Payments for the nine landlords averaged $9,474. The owner-operators added about 41 percent of the money to savings and 19 percent was used to pay on mortgages. Another 10 percent was spent by owner-operators in making adjustments on right of way tracts. These adjustments were similar to those made in Madison County. As was the case in Ellis County study, the landlords used a very small percentage of their payments on the right of way tracts.

Changes in Number, Size, and Tenure of Operations

Agricultural operations of the study and control areas were studied to determine what highway effects, if any, might be indicated. Efforts were directed toward detecting various changes in the study area operations not present in those in the control area. Tables 3 and 4 present the acreage and tenure arrangements for right of way tracts and the total operations of the study and control area operators for the study areas.

In the Madison County study agricultural operations are based on data collected from 15 study and 16 control area operators that furnished detailed information on total operations for all three periods. The study area operations were somewhat larger than those in the control area. In the "before" period, the study and control area ranchers were operating an average of 2.9 and 1.9 tracts containing an average of 896 acres and 577 acres, respectively. About 70 percent of the study areas total acreage was owner-operated compared to 82 percent in the control area. Right of way tracts averaged 362 acres in the study area compared to an average of 307 acres in hypothetical right of way tracts of the control operators.

One year after the highway was routed through the area, study area operators averaged 3.7 tracts compared with 2.2 tracts for the control operators. The increase in tracts for the study area operators was caused primarily by right of way severance. Tracts of the 15 study area operators averaged 192 acres in size after right of way taking. In the "after" study period, study

Table 3

Changes in Number and Size of Right of Way Tracts According to Tenure of the Operators in the Three Study Areas

	Before Period			During Period[2]			After Period		
	Tracts	Acres	Average Size Acres	Tracts	Acres	Average Size Acres	Tracts	Acres	Average Size Acres
Madison County Study									
Study Area Totals	29	10,493	362	51	9,806	192	49	9,764	199
Owner-Operators	27	8,147	302	47	7,498	160	46	7,496	163
Renter-operators	2	2,346	1,173	4	2,308	577	3	2,268	756
Control Area Totals	24	7,361	307	24	7,211	300	23	7,111	309
Owner-operators	20	5,921	296	20	5,771	286	20	5,771	286
Renter-operators	4	1,440	360	4	1,440	360	3	1,314	438
Ellis County Study									
Study Area Totals	55	8,485	154	88	7,418	84	86	7,369	86
Owner-operators	22	3,109	141	40	2,721	68	39	2,852	73
Renter-operators	33	5,376	163	48	4,697	97	47	4,517	96
Control Area Totals	53	9,550	180	47	9,062	193	42	8,422	200
Owner-operators	17	2,850	168	15	2,417	161	14	2,332	167
Renter-operators	36	6,700	186	32	6,645	208	28	6,190	221

Table 3
(continued)

Changes in Number and Size of Right of Way Tracts According to Tenure of the Operators in the Three Study Areas

	Before Period			During Period[2]			After Period		
	Tracts	Acres	Average Size Acres	Tracts	Acres	Average Size Acres	Tracts	Acres	Average Size Acres
Colorado-Fayette County Study									
Study Area Totals	22	3,090	140	35	2,715	78	28	2,684	96
Owner-operators	13	1,727	133	19	1,546	81	17	1,582	93
Renter-operators	9	1,363	151	16	1,169	73	11	1,102	100
Control Area Totals	20	2,188	115	20	2,188	115	20	2,402	120
Owner-operators	16	1,690	106	16	1,690	106	16	1,904	119
Renter-operators	4	498	125	4	498	125	4	498	125

[1]Includes tracts and acreage of all operators furnishing data on right of way tracts.

[2]Data represent during period for Madison and Ellis County studies, but Colorado-Fayette County data are based on tracts as they existed immediately after right of way taking.

Table 4

Tracts and Acreage Owned and Rented in Total Operations of Study and Control Area Operators that Furnished Complete Operation Data for All Three Periods, Before, During and After Construction of the Highway

	Before Highway				During Construction				After Construction			
			Average Size				Average Size				Average Size	
	Tracts	Acres	Tracts (Acres)	Operators (Acres)	Tracts	Acres	Tracts (Acres)	Operators (Acres)	Tracts	Acres	Tracts (Acres)	Operators (Acres)
Madison County Study		(1962)				(1964)				(1966)		
Study Area Totals	43	13,442	313	896	56	12,963	231	864	52	12,708	244	847
Owner-operators	30	9,437	315		42	9,026	215		38	8,463	223	
Renter operators	13	4,005	308		14	3,937	281		14	4,245	303	
Control Area Totals	30	9,236	308	577	35	9,598	274	600	35	9,838	281	615
Owner-operators	23	7,557	328		24	7,389	308		26	7,627	293	
Renter operators	7	1,679	240		11	2,209	201		9	2,211	246	
Ellis County Study		(1963)				(1965)				(1967)		
Study Area Totals	82	14,738	180	567	131	19,494	149	750	129	19,267	149	741
Owner-operators	29	5,276	182		49	6,045	123		50	6,193	124	
Renter operators	53	9,462	179		82	13,433	164		79	13,074	165	
Control Area Totals	80	12,906	161	380	83	13,596	164	400	89	14,270	160	420
Owner-operators	18	3,010	167		22	3,245	147		22	3,084	140	
Renter operators	62	9,896	160		61	10,351	170		67	11,181	167	

Table 4 (continued)

Tracts and Acreage Owned and Rented in Total Operations of Study and Control Area Operators that Furnished Complete Operation Data for All Three Periods, Before, During and After Construction of the Highway

	Before Highway				During Construction				After Construction			
			Average Size				Average Size				Average Size	
	Tracts	Acres	Tracts (Acres)	Operators (Acres)	Tracts	Acres	Tracts (Acres)	Operators (Acres)	Tracts	Acres	Tracts (Acres)	Operators (Acres)
Colorado-Fayette County Study		(1964)				(1966)				(1969)		
Study Area Totals	50	5,087	102	242	62	4,801	77	218	55	4,741	86	206
Owner-Operators	26	2,738	105		33	2,787	84		34	2,851	84	
Renter Operators	24	2,348	98		29	2,014	69		21	1,890	90	
Control Area Totals	50	6,359	127	332	45	5,176	115	272	43	5,205	121	274
Owner-Operators	35	5,113	146		33	4,065	123		30	3,991	133	
Renter operators	15	1,246	83		12	1,111	93		13	1,214	93	

area operators were still operating 14 of the 25 severed tracts. Of the 11 severed tracts not being used by the original operators in the after period, five small tracts containing a total of 60 acres were idle and the other six tracts, ranging from 2 to 40 acres, had been sold. Two of those sold were idle, while the other four were being used by the new owners. Four additional owners sold parts of remainder tracts, one acre or less, near two different highway interchanges for commercial use at an average of about $25,000 per acre.

With a few minor exceptions, there appeared to be no differences in the tenure patterns of total operations for the 15 study and 16 control area operators. Property sales were more prevalent in the study area than in the control area. These sales were influenced by the highway, since all but one of the tracts that were sold were small parcels along the highway.

In the Ellis County area analysis of right of way tracts is based on data from 39 operators with 55 tracts, averaging 154 acres, that were affected by the highway. In contrast to the ranching area in Madison County, only about one-third of the acreage in this intensive farming area was being operated by owner-operators. The owner-operated tracts along the highway ranged in size from 47 to 514 acres, averaging 141 acres, while the hypothetical right of way tracts of the control area ranged from 40 to 942 acres with the average being 180 acres.

There were 100 remainder tracts created by the highway. Three operators sold small remainders; two released rented tracts; two traded rented tracts; and four tracts were idled. Most adjustments of right of way tracts were completed by the end of the "during" period. At that time 88 of the 100 remainder tracts were still being operated by before period operators. The average size of these tracts had been reduced to 84 acres with owner-operated tracts averaging 68 acres in size and rented tracts averaging 97 acres. Most operators were still operating the same original tracts at the end of the study with only minor changes in tenure.

Total farm operations in the Ellis County study are based on 26 study area and 34 control area operators that furnished complete information on their farming operations for all the years of the study. The acreage in the right of way tracts represented about 35 percent of the acreage in the total operations of the Ellis County farmers. Thus in relation to total operations, right of way acquisition would have much less effect on the total operations. As shown in Table 4, the study area and control area operators were operating an average of 567 acres and 380 acres respectively, in the "before" period. Thirty-six percent of the study area land was owner-operated as compared to 23 percent for the control group. The ratio of owned to rented land changed very little throughout the study. By the end of the during period, the study area operators had added a net of 4,756 acres to their operations even though they lost 586 acres for right of way purposes.

A major portion of this increase in acreage was a result of 12 operators renting 13 additional tracts containing 5,537 acres of land. Based on the reports from the operators, some were trying to offset their loss to the highway by taking on more land. In some cases operators in both areas exchanged tracts of rented land. The switching of rented land in an intensive farming area is a common practice since the operators rent land on a year-to-year basis. However, most of the study area operators of rented tracts continued farming the tracts that were divided, leaving acreage on each side of the highway.

The net increase in study area acreage is attributable to both owner-operators and renter-operators in the Ellis County study, with the latter group accounting for about 80 percent of the increase. In all, the study area operators increased their total acreage by 24 percent compared to a 10.5 percent increase for control operators. But in the control area, renter-operators accounted for almost 100 percent of the increase.

In the Colorado-Fayette County area, changes in number, size and tenure of operations are based on data collected from 21 study area operators with 22 tracts affected by the highway and 19 control operators with 20 hypothetical right of way tracts, Table 3. The 22 tracts affected by the highway ranged from 41 to 480 acres in size and averaged 140 acres. In the control area the 20 hypothetical right of way tracts ranged from 20 to 320 acres in size and averaged 109 acres.

Right of way takings totaled 375 acres and created 35 remainders averaging 78 acres and with a range in size from 1 to 304 acres. Following combinations of remainders and sales into non-agricultural use, the number of right of way tracts in agricultural operation has been reduced to 28 by the end of the study period. Nine of the right of way takings took land from only one side of tracts and on balance, these remained unchanged through the remainder of the study in number, total acreage and average size. Also there was no change in tenure of these tracts. Thirteen takings divided as severed right of way tracts resulting in 26 remainder parcels with an average size of 64 acres. By the end of the study, these had been reduced in number to 19 averaging 85 acres in size. Thus the combination of tracts occurred wholly among the severed tracts as did the net decrease in agricultural land. The major adjustments relating to severed tracts involved four renter-operators making arrangements with their landlords to "trade" operatorship. These arrangements reduced separately operated tracts by four. One owner-operator of a severed tract deeded the isolated remainder to his son-in-law who combined it with adjacent operations. Two small severed remainders were sold for non-agricultural use and a portion of one severed remainder was leased to an oil company for a service station site.

Operations in the Colorado-Fayette County area, being somewhat smaller than those in the Madison or Ellis County areas, had a larger percentage of their land acquired for right of way. Total operations in the study area averaged 242 acres in

size and 332 acres in the control area. The average sizes of the 50 tracts that each group operated were 102 acres for the study operators and 127 acres for the control operators, Table 4.

In the "before" period the study area operators owned about 55 percent of the total land they operated compared to 81 percent for the control area operators. Much of this difference arose from the fact that two of the largest control area operators owned a major proportion of their farmland. By the end of the study, owner-operated acreage represented 60 percent of the study area operators' farmland compared to 76 percent of the control area operations. Thus in relation to total operations, right of way acquisition seemed to have no adverse effects on owner-operatorship of agricultural land.

Between the "before" and "during" period the study area operators decreased their total acreage by 286 acres with an increase of 12 tracts. However, the control group decreased its acreage by 1,183 acres and tracts by five. Right of way remainders accounted for 10 of the 12 added tracts in the study area in the "during" period. Between the "during" and "after" period, operations changed very little as, the study area operators reduced their total acreage operated by only 60 acres, while the control operators increase in acreage operated. The changes in size of operations from year to year demonstrates the degree of fluctuation in agricultural holdings and also the magnitude of adjustments not related to right of way takings.

Changes in Kind and Intensity of Land Use

One of the primary concerns of the study was the effect the highway had on land use of the right of way tracts: Tables 5, 6 and 7 present major land uses on the right of way tracts in the study and control area for each of the three studies.

In the Madison County study area there appeared to be no significant differences in changes in ratios of cropland to pastureland between the study and control area operators. However, study and control area operators did not depend heavily on crop production for income as only a small portion of their land was classified as cropland. There was a noticeable trend to more intensive use of pastureland in both areas in the "during" and "after" study periods, but the trend in the study area was more pronounced. In the "before" period the two areas had approximately the same percentage of land in improved pastures, but by the "after" period almost one third of the land in right of way tracts along the highway was in improved pastures as compared to 16 percent for the control area operators. The major difference between the two areas can probably be related to compensation recieved for right of way land. In adjusting for the loss of acreage, the study area operators were more aggressive in improving their pastureland. The importance of the major increase in improved pastures is their grazing potential compared to that of unimproved or wooded land.

Table 5

Changes in Land Use of Right of Way Study and
Control Tracts of 15 Study Area
and 16 Control Area Operators*
Madison County Area

	1962 Percent of Total Land		1964 Percent of Total Land		1966 Percent of Total Land	
	Study	Control	Study	Control	Study	Control
Cropland	4.4(6)	21.0(12)	4.7(7)	17.2(12)	4.3(5)	17.4(12)
Harvested	2.3(3)	3.3(6)	0.7(2)	1.9(4)	1.8(2)	1.0(4)
Harvested & Grazed	0.7(2)	16.6(8)	2.6(4)	14.7(10)	1.0(2)	14.0(8)
Government Program	1.4(1)	1.1(2)	1.4(1)	1.8(4)	1.5(1)	2.4(5)
Pastureland	95.1(15)	78.4(16)	93.9(15)	82.3(16)	95.3(15)	82.1(16)
Woodland	16.3(12)	49.4(14)	15.6(9)	49.4(13)	15.0(8)	46.0(13)
Cleared Unimproved	66.9(15)	18.0(9)	59.1(14)	21.7(10)	46.5(12)	20.3(11)
Cleared Improved	11.9(8)	11.1(4)	19.2(11)	11.2(4)	32.8(13)	15.8(8)
Other Land 1/	0.5(11)	0.5(12)	1.4(10)	0.5(12)	1.4(10)	0.5(12)
Total Acreage	6,967	4,089	6,539	4,082	6,522	4,048

*Figures in parentheses represent number of operators.

1/ Includes idle land and land in buildings and roads.

Table 6

Changes in Land Use of Right of Way Study and Control Tracts of 36 Study Area and 34 Control Area Operators[1] Ellis County Area

	1963 Percent of Acres		1965 Percent of Acres		1967 Percent of Acres	
	Study	Control	Study	Control	Study	Control
Cropland	80.0(36)	83.6(34)	78.7(36)	83.3(34)	76.3(35)	83.5(33)
Harvested	61.9(35)	66.7(31)	55.8(34)	69.0(31)	50.1(34)	59.5(31)
Harvested and Grazed	1.5(3)	2.5(7)	5.7(7)	2.2(5)	4.5(7)	3.2(7)
Grazed	11.4(13)	5.1(6)	12.7(15)	4.1(11)	13.4(16)	5.4(11)
Government Program	3.0(5)	7.4(13)	3.5(5)	5.5(11)	7.6(19)	12.3(33)
Idle and Waterways	2.2(10)	1.9(8)	1.0(10)	2.5(16)	0.7(9)	3.1(11)
Pastureland	20.0(20)	16.4(16)	21.3(22)	16.7(16)	23.7(21)	16.5(15)
Woodland	1.3(6)	1.4(4)	1.3(6)	1.4(4)	1.3(5)	1.1(2)
Cleared	16.3(17)	8.3(10)	13.7(15)	4.4(5)	10.2(13)	3.8(5)
Improved	1.8(8)	5.9(6)	5.4(15)	10.0(10)	11.7(16)	10.5(10)
Other Pastureland[2]	0.6(4)	0.8(2)	0.9(5)	0.9(2)	0.5(4)	1.1(3)
Total Acreage	8026(36)	8659(34)	7418(36)	8461(34)	7369(35)	8422(34)

[1] Figures in parentheses are numbers of operators.

[2] Includes idle and other unaccounted for pastureland.

Table 7

Changes in Land Use of Right of Way Study and Control Tracts of 21 Study Area and 19 Control Area Operations[1/] in Colorado-Fayette County Area

Type of Land	1964 Percent of Acres		1966 Percent of Acres		1969 Percent of Acres	
	Study	Control	Study	Control	Study	Control
Cropland	26.0(18)	38.2(19)	26.0(18)	39.7(19)	26.9(19)	40.6(19)
Harvested	11.0(13)	20.3(18)	7.6(12)	14.5(14)	5.9(10)	12.6(15)
Harvested and Grazed	3.8(6)	2.3(4)	4.0(6)	2.5(6)	4.2(5)	8.3(6)
Grazed	7.7(8)	14.3(13)	10.0(13)	20.7(16)	12.0(13)	19.1(14)
Government Program	3.5(5)	1.3(3)	4.4(6)	2.0(3)	4.8(5)	0.6(2)
Pastureland	73.0(21)	60.4(19)	72.9(21)	58.6(19)	72.0(21)	57.8(19)
Improved	3.2(6)	16.5(6)	8.6(10)	16.8(7)	16.2(16)	29.9(14)
Cleared	50.7(21)	28.3(15)	45.4(19)	27.8(16)	38.2(20)	16.9(12)
Woodland	19.1(14)	15.6(12)	18.9(18)	14.0(10)	17.6(15)	11.0(10)
Other Land	1.0(19)	1.4(17)	1.1(16)	1.7(17)	1.1(16)	1.6(17)
Total Acreage	3,090(21)	2,188 (19)	2,697(21)	2,188 (19)	2,684(21)	2,402 (19)

[1/] Includes the 18 study and 19 control area operators cooperating all three years plus the three study area operators furnishing partial information. Figures in parentheses are numbers of operators.

In the total operations of the 15 Madison County study area operators and 16 control area operators most changes occurring in the use of cropland generally followed a similar pattern and none of the changes should be attributed to the highway. However, the intensity in use of pastureland in the total operations followed the same pattern as on the right of way tracts. The study area operators reported that during the study period their acreage in improved pastures increased by 196 percent compared to only 18 percent for the control group. Also, the study area operators showed a considerable increase in acreage fertilized. Statistical tests showed that both the change in number of fertilized acres and the change in the ratio of fertilized to total acres were significantly higher in the study area than in the control area.

In the Ellis County study, more than 80 percent of the land was classified as cropland at the beginning of the study. During the study period, cropland acreage in the study area right of way tracts declined about four percentage points, while that of the control area remained constant. The takings for right of way were composed of 73 percent cropland and 27 percent pastureland. This fact alone contributed to the decline of cropland in relation to pastureland acreage, which increased about four percentage points.

The changes in intensity of land use are pointed out by the 36 study area operators having a 12 percent decrease in cropland harvested on the right of way tracts compared to a seven percent decrease by the control area operators. The decrease in cropland acreage harvested by study area operators resulted primarily by owner-operators of right of way tracts devoting larger portions of their cropland to livestock production. It was found that the owner-operators of tracts affected by the highway made the major shifts in land use. They increased their use of pastureland acreage more than did their counterparts in the control area. This seems to indicate they made some changes in their land use as a result of the highway influence.

In the total operations of the 26 study area and 34 control area operators in Ellis County, there were notable differences in kinds and intensity of land use between the two groups of operators. However, according to the operators, the majority of the land use changes were not caused by the highway but by their decisions to change crops or to establish more improved pastureland.

Based on the combined land use pattern on the right of way tracts in the Colorado-Fayette County study, there was little difference between farm operations in the study and control area. Throughout the study period, owner-operators in both areas were devoting more of their cropland to livestock operations and clearing and improving a greater percentage of their pasture-land. There did not appear to be any significant changes made by the study area operators that might be related to the effects of the highway.

As was the case with the right of way tracts, land use patterns of the study and control area total operations remained rather stable throughout the study. Even though right of way acquisitions had some minor effects on the land use of right of way tracts, the impact of such effects tended to be obscured by the fact that study area operators farmed large acreages of other land.

Changes in Expenses and Income

One of the major objectives of the study was to determine the effects, if any, of right of way acquisition upon net income from agricultural operations. To pursue this objective, cash expenses and cash receipts were compared for the two groups of operators between the "before", "during" and "after" periods in each of the three study areas. In this analysis, the control area operations are used to account for any external or general influences not attributable to the highway and to control price trends of operating cost as well as farm receipts.

Because of the variations in the overall sizes of the study area operations in relation to the amount of land directly affected by the relocation of the highway, it is difficult to accurately determine the effects that the highway had on annual income from agricultural sources of the study area operators. The term net income as used in this report represents net cash operating income from agricultural sources. Tables 8, 9 and 10 show the various sources of income from agricultural and the cash operating expenses for the study and control operators for each of the three study areas.

Table 8

Agricultural Income and Expenses of the 15 Study Area and 16 Control Area Operators in 1962, 1964, and 1966[1/] in Madison County Area

Item	Study Area			Control Area		
	1962	1964	1966	1962	1964	1966
Income						
Livestock	$123,678(14)	$89,854(15)	$140,375(15)	$53,050(15)	$60,308(16)	$75,606(16)
Crops[2/]	1,785(3)	3,175(3)	2,770(2)	5,585(5)	6,835(4)	8,315(4)
Government Programs[3/]	3,500(10)	5,510(10)	5,490(12)	2,510(10)	5,435(13)	7,295(11)
Other Farm Income[4/]	16,000	0	0	0	0	0
Total Farm Income	144,963	98,539	148,635	61,145	72,578	91,216
Average Per Operator	9,664	6,569	9,909	3,822	4,536	5,701
Expenses						
Operating Expense	73,960(15)	78,875(15)	89,075(15)	31,290(16)	53,000(16)	55,460(16)
Livestock Purchased	21,890(8)	7,260(7)	14,965(5)	4,085(8)	9,940(9)	11,535(8)
Total Operating Expense	95,850	86,135	104,040	35,375	62,940	66,995
Average Expense Per Operator	6,390	5,742	6,936	2,211	3,934	4,187
Net Cash Operating Income	49,113	12,404	44,615	25,770	10,080	24,221
Average Per Operator	3,274	827	2,974	1,611	630	1,514

1/ Figures in parentheses represent number of operators.

2/ Represents value of crops sold.

3/ Includes government payments received for idle grain land and for conservation practices approved by the Agricultural Stabilization and Conservation Personnel.

4/ Sale of dairy products in 1962.

5/ Receipts in 1964 were affected some by lower cattle prices.

Table 9

Agricultural Income and Expenses of the 26 Study Area and 34 Control Area Operators in 1963, 1965 and 1967 [1]
in Ellis County Area

Item	Study Area			Control Area		
	1963	1965	1967	1963	1965	1967
Gross Income						
Crop	$370,313(23)	$461,943(24)	$303,338(23)	$476,937(31)	609,590(32)	432,191(31)
Cattle Sales	82,999(21)	104,937(19)	150,406(20)	31,115(25)	39,387(26)	39,901(22)
Government Payments	3,628 (6)	9,107(10)	65,095(17)	12,781(19)	8,758(11)	103,579(32)
Custom Work	12,300 (8)	19,500 (5)	11,373 (6)	13,530(10)	12,414 (5)	6,085(10)
Other Farm Income [2]	9,380 (4)	18,740 (5)	25,500 (4)	1,718 (6)	1,558 (3)	1,910 (5)
Total Income	478,620	614,227	555,512	536,081	671,707	583,666
Average Income Per Operator	18,408	23,624	21,373	15,767	19,756	17,167
Cash Expenses						
Operating Expense	299,527(26)	360,080(26)	310,599(26)	357,198(34)	373,202(34)	376,257(34)
Cattle Purchased	3,845(11)	36,951(16)	39,180(15)	7,683(10)	8,394 (8)	12,022 (7)
Total Expense [3]	303,372	397,031	349,779	364,881	381,596	388,279
Average Expense Per Operator	11,668	15,270	14,453	10,732	11,223	11,420
Net Cash Operating Income						
Total	175,248	217,196	205,933	171,200	290,111	195,387
Average Per Operator	6,740	8,354	7,920	5,035	8,533	5,747

[1] Figures in parentheses represent number of operators.

[2] Includes income from the sale of poultry, hogs, horses and sheep.
Cattle purchases may reflect some build up of herds and thus may not be fully an operating expense. However, due to the frequency of trading of livestock, the inclusion of purchases should give a more accurate pattern of cash operating incomes.

[3] Receipts were much greater in 1965 due to better than average crop yields.

Table 10

Agricultural Income and Expenses of the 18 Study and 19 Control Area Operators in 1964, 1966 and 1969[1/]
Colorado-Fayette County Study Area

Item	Study Area			Control Area		
	1964 Dollars	1966 Dollars	1969 Dollars	1964 Dollars	1966 Dollars	1969 Dollars
Gross Income						
Crops	4,833(5)	2,272(4)	3,025(5)	2,555(8)	2,150(5)	2,335(3)
Cattle	23,658(16)	35,816(16)	53,442(17)	41,647(18)	57,265(19)	68,820(18)
Other Sales[2/]	51,085(10)	53,481(10)	63,864(9)	60,198(9)	84,065(9)	116,241(8)
Government Program[3/]	2,110(6)	2,772(7)	2,791(8)	2,245(7)	1,306(8)	960(4)
Other Farm Income[4/]	248(3)	1,406(2)	1,750(3)	400(2)	300(2)	300(2)
Custom Work	0	0	0	7,000(2)	8,000(2)	10,000(2)
Totals	81,934(18)	95,747(18)	124,872(18)	114,045(19)	153,086(19)	198,656(19)
Average Per Operator	4,552	5,319	6,937	6,002	8,057	10,456
Cash Expenses						
Operating Expenses	63,706(18)	71,644(18)	76,099(18)	85,412(19)	90,647(19)	117,585(19)
Cattle Purchases	2,540(3)	1,700(3)	2,700(4)	1,755(4)	15,955(8)	12,767(10)
Other Livestock Purchases[5/]	410(2)	0	400(2)	500(1)	2,300(3)	6,500(3)
Total Expenses	66,656(18)	73,344(18)	79,199(18)	87,667(19)	108,902(19)	136,852(19)
Average Per Operator	3,703	4,075	4,400	4,614	5,732	7,203
Net Cash Operating Income						
Total	15,278	22,403	45,673	26,378	44,184	61,804
Average Per Operator	849	1,245	2,537	1,388	2,325	3,253

[1/] Figures in parentheses represent number of operators.

[2/] Includes sale of dairy cattle, milk, hogs, chickens, turkeys, eggs and pecans.

[3/] Includes payments for land in grain and cotton programs and money received for conservation practices.

[4/] Includes income from rent, hunting leases and other miscellaneous items.

[5/] Includes purchase of dairy cows, turkeys and chickens.

In each of the three studies the study area operators generally experienced a setback in the period immediately following right of way acquisition. But with additional time to make adjustments and improvements, particularly to pastures, the operators in each of the three areas were able to show substantial increases in net income by the end of the studies.

In the Madison County area the study area operators experienced a 75 percent decrease in income in the "during" period as compared to a 61 percent decrease for the control group, Table 8. A large portion of these decreases were caused by lower prices for livestock. However, by the end of the study, the study area operators had a much greater increase than did the control group. This was accomplished primarily through aggressive management by the study area operators, which increased the grazing capacity of their pasturelands.

In the Ellis County area the changes in expenses and income were based on the comparisons of total operations of 26 study area and 34 control area operators. As shown in Table 9, study area operators increased their average income even though they lost acreage to the highway. In the "before" period, the average was $6,740 for study area operators and $5,035 for the control operators. By the end of the study the average was $7,970 for study area operators and $5,747 for the control operators. In the period following construction, even though both groups of operators had increases in income, the study area operators

did not fare as well as did their counterparts. The average income for the study area group was $8,354 compared to $8,533 for the control area operators.

In the Colorado-Fayette study, changes in expenses and income were based on total agricultural operations of 18 study area and 19 control area operators. As shown in Table 10, it appears that the income of the study area operators was not noticeably affected by the loss of land to right of way. Operators in the study area had a greater increase in net income between the "during" and "after" periods and between the "before" and "after" periods than did operators in the control group. However, a smaller increase in net income for the study area operators between the "before" and "during" periods was also characteristic of the income patterns found in the other two studies. This indicates that generally the study area operators in each area did experience a setback in the period immediately following right of way acquisition.

It was not expected that the highway would have a noticeable effect on non-farm income of the study area operators. However, by comparing the income from non-farm sources with income from agriculture, one can determine the relative importance of agriculture to the operators and in turn gain additional perspective regarding right of way takings. In Madison and Ellis County, less than 40 percent of the study and control area operators had income from outside sources; in the Colorado-Fayette

County area about 75 percent of each group of operators had income from outside sources. In Madison County area the study and control operators reported that they received about 60 percent of their income from agriculture; while in Ellis County operators received over 80 percent of their income from farm production. In contrast, income from agriculture in the Colorado-Fayette County area represented only 25 percent of study area operators income and 39 percent of the income of the control group. The ratio of agricultural income to other income remained about the same throughout the study periods. Among the three study areas the farm operators of the intensive farming area in Ellis County were much more dependent on agriculture for their livelihood than were operators in the other two areas studied.

Changes in Travel Requirements

One of the main concerns of an operator regarding right of way acquisition for a limited access type highway is the extent that his travel in the local area will be affected.

On trips to and from the nearest shopping centers, some operators in each of the three study areas had distances shortened while others had to travel farther after the new highway was completed. Overall, the operators reported that the improved driving conditions on the old route and on the new highway or its service roads generally benefited them in terms of increased safety, comfort and economy.

Only those operators with severed tracts noticed any changes in travel connected with farm operations. One-way trip distances were measured to each tract in the total operations of the study and control operators, both "before" and "after" construction of the highway. In the Madison County study, travel connected with operations of right of way tracts was increased from .4 to 4.3 miles for 16 of the 21 study area operators; decreased for one operator; and three operators experienced no change in travel. Distances were increased by an average of 2.1 miles per operator. Operators in the Madison County area reported that they made an average of 184 trips each year for the purpose of feeding and maintaining livestock operations on their severed tracts. About 54 percent of these trips were for the purpose of feeding livestock during winter months. Those operators still using the severed portions of the right of way tracts in the "after" period, reported that they each had to travel an average of 393 extra miles annually in order to continue livestock operations on their severed tracts.

In the Ellis County study, travel connected with the intensive farming operations of the right of way tracts was increased from .1 miles to 4.2 miles for 23 operators. One operator had his travel distance shortened. The operators reported they were required to make an average of 186 additional trips and 372 miles annually in operating the severed tracts. Even though this is an area of intensive farming, only about 35 percent of the trips were connected with crop production while 65 percent of the trips were for the purpose of feeding or maintaining their livestock on the severed tracts.

In the Colorado-Fayette County area, an analysis of each operator's distance and route to nearest shopping center revealed that 9 of the 21 study area operators experienced some changes in their travel patterns. The other operators were not affected, as they continued using the same routes to town that they used before the highway was constructed. For the nine operators the distance to the nearest shopping center was increased from 0.1 to 0.4 miles, an average of 0.2 miles, but they reported that the improved driving conditions on IH10 frontage roads more than offset the extra distance.

The new highway did not affect the travel routes to Weimar of the 19 control operators. No roads used by the control operators had closings or route changes, so they continued using their regular routes to town.

In the "before" period there were 13 study and 15 control area operators who had extra travel to the multiple tracts in their operations. Eight study and four control area operators had single tract operations before the highway was constructed. The 13 study area operators traveled 130 one-way miles to reach their various tracts from the headquarters, as compared to the 83 miles traveled by the 15 control area operators to reach their extra tracts. The changes in total distances between the "before" and "after" periods were very small.

Only those study area operators with severed tracts noticed any changes in travel connected with farm operations. Seven still operating the remainders at the end of the study. These

seven operators had to travel from 0.1 to 1.8 extra one-way miles to reach their severed tracts. Annually, they had an average of 111 trips and averaged 120 extra miles.

Glossary of Terms

After period - A one year period following the completion of the highway.

Before period - A one year period before construction of the highway was begun.

Control area operators - Those operators located in an area nearby but outside of direct highway influence.

During period - A one year period while the highway was under construction.

Net cash operating income - This was obtained by substracting cash operating expenses from cash income.

Owner-Operator - An operator that owns and operates his own land.

Remainder tract - The remaining part of a property from which land was acquired for right of way. It can be one or more remainder parcels depending on the alignment of highway through the subject property.

Renter-operator - An operator that rents or leases a tract of land either on a cropshare basis or cash lease.

Severed tract - A parcel of land that was separated from original tract by the highway.

Study area operators - Those operators affected by the acquisition of land for Right of Way.

Taking - That portion of the right of way tract purchased by the Highway Department for the Highway.