GRAIN DRAWING CAPABILITIES AND PURCHASE OPTIONS OF THE MOHALL, NORTH DAKOTA GRAIN ELEVATOR

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INTRODUCTION

ELEVATOR LOCATION

Mohall is located in northwestern North Dakota and is situated along Highway 5 approximately 50 miles northwest of Minot. Burlington Northern Railroad provides rail service to the community while independent owner-operators supply truck service. Mohall grain elevators are located approximately 63 miles north on a 78 mile branch line that runs from Sherwood to Granville.

GRAIN PRODUCTION

Hard red spring wheat (HRS), durum and barley are the three principal crops grown in Renville and Bottineau counties (Table 1). Sunflower has recently emerged as a significant crop with over a million hundredweight being produced in Bottineau county in both 1981 and 1982. Production of HRS, durum, barley and sunflower has increased substantially in the past few years in both counties. HRS production in Renville and Bottineau counties increased from 1.9 million bushels and 1.6 million bushels in 1979 to 3.9 million bushels and 3.7 million bushels, respectively, in 1982. Durum production in Renville county increased from 2.0 million bushels in 1979 to 3.0 million bushels in 1982. Production of durum in Bottineau county was 7.4 million bushels in 1982 compared to 4.1 million bushels in 1979.

The dramatic increases in crop production in both Renville and Bottineau in recent years has important merchandising implications. Foremost, it allows competitive elevators to increase volume thereby enhancing profitability. However, increased production in a given

TABLE 1. PRODUCTION OF SELECTED CROPS, RENVILLE AND BOTTINEAU COUNTIES.

Crop/County	1982	1981	1980	1979	Five Year Average 1977-1981
			bushels		
HRS:					
Renville	3,927,000	3,451,000	1,997,000	1,881,000	2,667,400
Bottineau	3,749,000	2,805,000	1,408,000	1,635,000	2,271,100
Durum:					
Renville	2,902,000	3,218,000	1,606,000	1,990,000	2,279,600
Bottineau	7,384,000	7,629,000	4,928,000	4,053,000	5,389,600
Barley:					
Renville	1,643,000	1,540,000	523,000	1,100,000	1,253,600
Bottineau	3,752,000	3,808,000	1,768,000	2,170,000	3,045,600
Oats:					
Renville	1,251,000	955,000	373,000	439,000	835,200
Bottineau	992,000	669,000	285,000	276,000	809,500
Rye:					
Renville	42,100	30,600	12,100	69,700	53,300
Bottineau	278,900	278,900	115,100	188,200	226,100
Sunflower:[a]					
Renville	406,900	321,700	251,440	296,470	195,660
Bottineau	1,420,200	1,158,000	475,080	1,042,940	800,670
Flax:					
Renville	58,000	49,600	39,300	143,300	115,000
Bottineau	313,900	239,400	235,900	424,700	349,300

[a]Hundredweight.

Source: North Dakota Crop and Livestock Reporting Service, North Dakota Agricultural Statistics, 1983, Ag Statistics No. 52, June 1983.

area and increased volume at a particular elevator are not mutually inclusive. Managers must be able to effectively merchandise grain in a manner that allows for attracting sufficient volume at profitable margins. Thus, the competitive environment as well as area production will dictate the relative volume and profitability of a particular facility.

GRAIN MOVEMENTS

Renville/Bottineau Counties

Grain margins of country elevators depend to a large extent on the volume of grain that is handled. Therefore, it is important to look at area (Renville and Bottineau counties) grain movements as opposed to area production. Grain movements tend to reflect more accurately the source of market share. That is, grain movements give a more realistic picture of potential volume than does production, although it is important to consider both.

Hard red spring wheat (HRS) movements from Renville and Bottineau counties increased substantially in 1982-83 compared to the previous four crop years (Table 2). Movements topped a million bushels during that crop year, more than double that of 1978-79 when 421,859 bushels were moved from the two counties. HRS movements are typically to Duluth/Superior (D/S). With the exception of 1979-80 and 1980-81, more than half of HRS movements went to the two Great Lakes ports.

Durum movements from Renville and Bottineau counties are typically to D/S. As was the case in HRS movements, durum movements increased significantly in 1982-83 compared to movements in previous years. Slightly over 2.4 million bushels moved from the two counties

TABLE 2. GRAIN MOVEMENTS FROM RENVILLE AND BOTTINEAU COUNTIES, 1978-79 to 1982-83.

Commodity/Year	D/S	MSP	PNW	Other	Total
			bushels		
HRS:					
1978-79	272,732 (65%)	62,254 (15%)	53,709 (13%)	33,164 (8%)	421,859 (100%)
1979-80	139,635 (37%)	58,839 (16%)	69,664 (18%)	109,986 (29%)	378,124 (100%)
1980-81	35,232 (17%)	22,214 (11%)	22,911 (11%)	121,377 (60%)	201,734 (100%)
1981-82	165,001 (74%)	36,692 (16%)	9,237 (4%)	13,443 (6%)	224,374 (100%)
1982-83	542,836 (53%)	229,576 (22%)	186,332 (18%)	72,468 (7%)	1,031,212 (100%)
Durum:					
1978-79	1,155,624 (90%)	40,815 (3%)	--	84,351 (7%)	1,280,826 (100%)
1979-80	775,230 (60%)	259,721 (20%)	7,470 (1%)	259,652 (20%)	1,302,073 (100%)
1980-81	391,043 (58%)	138,115 (20%)	9,491 (1%)	138,079 (20%)	676,728 (100%)
1981-82	840,529 (66%)	221,620 (17%)	752 (1%)	208,561 (16%)	1,271,462 (100%)
1982-83	1,141,753 (47%)	893,370 (37%)	--	380,170 (16%)	2,415,293 (100%)
Barley:					
1978-79	70,567 (5%)	240,785 (17%)	44,761 (3%)	1,040,202 (75%)	1,396,315 (100%)
1979-80	35,023 (3%)	97,253 (9%)	23,774 (2%)	893,059 (85%)	1,049,109 (100%)
1980-81	82,686 (10%)	33,112 (4%)	104,187 (12%)	623,088 (74%)	843,073 (100%)
1981-82	105,790 (6%)	40,128 (2%)	216,456 (12%)	1,465,971 (80%)	1,828,345 (100%)
1982-83	14,300 (1%)	268,726 (8%)	51,245 (2%)	3,024,982 (90%)	3,359,253 (100%)

continued

TABLE 2. - continued

Sunflower:					
1978-79	212,848 (93%)	6,244 (3%)	--	8,804 (4%)	227,896 (100%)
1979-80	211,326 (63%)	29,068 (9%)	64,108 (19%)	28,944 (9%)	333,446 (100%)
1980-81	125,580 (29%)	119,956 (27%)	9,136 (2%)	184,096 (42%)	438,768 (100%)
1981-82	432,280 (56%)	64,204 (8%)	17,600 (2%)	255,216 (33%)	769,300 (100%)
1982-83	1,458,620 (66%)	106,400 (5%)	--	634,234 (29%)	2,199,284 (100%)
Misc.					
1978-79	36,938 (19%)	59,125 (30%)	81,530 (42%)	16,530 (9%)	194,123 (100%)
1979-80	32,110 (14%)	62,896 (28%)	105,249 (47%)	22,950 (10%)	223,205 (100%)
1980-81	--	68,626 (24%)	202,161 (71%)	12,846 (5%)	283,633 (100%)
1981-82	42,596 (17%)	87,872 (34%)	95,962 (37%)	30,848 (12%)	257,008 (100%)
1981-83	43,268 (9%)	240,531 (52%)	79,977 (17%)	200,135 (22%)	463,911 (100%)

during 1982-83 almost double the 1.3 million bushels that moved during the previous peak year of 1979-80.

Barley movements ranged from a low of 843,073 bushels in 1980-81 to a high of 3.4 million bushels in 1982-83. Grain elevator managers shipped the majority of barley to destinations other than Duluth/Superior, Minneapolis/St. Paul or Pacific Northwest.

Following the trends of the other grains, sunflower movements peaked substantially higher in 1982-83 compared to previous years. About 2.2 million bushels were shipped from Renville and Bottineau counties with two-thirds of the shipments going to D/S. Movements of sunflower in 1982-83 almost tripled compared to sunflower shipments in 1981-83, the previous peak year.

Mohall[1]

Grain movements from Mohall were significantly lighter in the early 1980s compared to the late 1970s (Table 4). Between 1978-79 and 1982-83 HRS movements decreased 42 percent while movements of durum, barley, sunflower and miscellaneous grains fell 90, 91, 55 and 77 percent, respectively. Lighter movements from Mohall came at a time when grain movements from Renville and Bottineau counties increased.[2]

HRS and durum were the two predominant crops moved from Mohall between 1978-79 and 1982-83. Total movement of HRS during the 1978-79 to 1982-83 period varied from a low of 260,808 bushels to a high of 443,509 bushels. Duluth/Superior was the major destination for

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[1]See Appendix I for additional data on grain movements by commodity, destination, and mode from Mohall.

[2]See discussion of county grain movements in the previous section.

TABLE 3. GRAIN MOVEMENTS FROM MOHALL TO VARIOUS DESTINATIONS, 1978-79 TO 1982-83.

Commodity/Year	D/S	MSP	PNW	Other	Total
			bushels		
HRS:					
1978-79	230,393 (52%)	111,136 (25%)	14,265 (3%)	87,715 (20%)	443,509 (100%)
1979-80	85,988 (22%)	134,760 (34%)	40,549 (10%)	130,149 (33%)	391,446 (100%)
1980-81	55,976 (16%)	46,079 (13%)	202,076 (59%)	39,262 (11%)	343,393 (100%)
1981-82	44,094 (15%)	98,637 (33%)	71,776 (24%)	80,882 (27%)	295,389 (100%)
1982-83	86,941 (33%)	119,601 (46%)	6,061 (2%)	48,205 (18%)	260,808 (100%)
Durum:					
1978-79	403,206 (30%)	884,139 (65%)	--	66,452 (5%)	1,353,797 (100%)
1979-80	268,722 (55%)	129,108 (27%)	--	88,451 (18%)	456,281 (100%)
1980-81	138,043 (60%)	36,989 (16%)	--	55,988 (24%)	231,020 (100%)
1981-82	119,935 (38%)	76,248 (24%)	--	123,558 (39%)	319,741 (100%)
1982-83	51,024 (38%)	43,569 (33%)	--	39,250 (29%)	133,843 (100%)
Barley:					
1978-79	10,040 (3%)	13,302 (4%)	5,546 (2%)	272,418 (91%)	301,306 (100%)
1979-80	12,077 (6%)	21,071 (11%)	23,658 (12%)	143,105 (72%)	199,911 (100%)
1980-81	9,156 (6%)	31,578 (22%)	41,289 (29%)	62,736 (43%)	144,759 (100%)
1981-82	33,563 (33%)	34,198 (34%)	12,517 (12%)	20,777 (21%)	101,055 (100%)
1982-83	4,486 (16%)	895 (3%)	18,778 (67%)	3,835 (14%)	27,994 (100%)

continued

TABLE 3. - continued

Sunflower:					
1978-79	48,954 (88%)	--	--	6,555 (12%)	55,509 (100%)
1979-80	128,296 (83%)	--	--	25,496 (17%)	153,792 (100%)
1980-81	65,688 (34%)	83,192 (43%)	12,700 (7%)	32,766 (16%)	194,346 (100%)
1981-82	100,813 (53%)	83,920 (44%)	--	5,644 (3%)	190,377 (100%)
1982-83	2,092 (8%)	23,032 (92%)	--	--	25,124 (100%)
Misc.					
1978-79	9,834 (6%)	46,773 (28%)	100,208 (60%)	11,399 (7%)	168,214 (100%)
1979-80	10,747 (6%)	24,291 (13%)	143,889 (76%)	11,223 (6%)	190,150 (100%)
1980-81	--	11,847 (20%)	32,058 (54%)	15,535 (26%)	59,440 (100%)
1981-82	--	77,755 (76%)	17,419 (17%)	6,973 (7%)	102,147 (100%)
1982-83	889 (2%)	32,954 (84%)	5,588 (14%)	--	39,431 (100%)

HRS in 1978-79 while MSP was the major destination in 1979-80, 1981-82 and 1982-83. Over half of HRS shipments went to the PNW in 1980-81.

Total movement of durum during the 5-year period varied from a high of 1.35 million bushels in 1978-79 to a low of 133,843 bushels in 1982-83. MSP was the major market for durum shipments in 1978-79 while D/S has been the predominant market since then (1979-80 to 1982-83).

RAIL RATE STRUCTURE

Rail rate structure as well as the prices of alternative service levels are of extreme importance to enterprises considering investing in grain elevators. Rate spreads (the price difference between alternative service levels), to a large extent dictate how much can be invested in a particular facility.

A four-tiered structure exists for shipping grain by rail from Mohall to various destinations (Table 5). Rail rates to Duluth/Superior (D/S) include single-car, 3-car, 26-car and 52-car service levels. Rates to the Pacific Northwest (PNW) are for single-car, 26-car multiple origin, 26-car single origin and 52-car service. Rates to both D/S and PNW decrease as size of the consignment increases. For example, the single-car rate from Mohall to D/S is 128 cents per cwt., while the 3-car, 26-car and 52-car rates are 124, 112 and 107 cents per cwt., respectively. Rates to the PNW decrease from 221 cents per cwt. for single-car service to 184 cents per cwt. for 52-car service.

Savings on 52-car shipments as opposed to single-car shipments are 17 percent to the PNW and 16 percent to D/S. In absolute terms the single-car/52-car differential is 37 cents to PNW and 21 cents to D/S.

TABLE 4. RAIL RATES TO DULUTH/SUPERIOR AND PACIFIC NORTHWEST FROM MOHALL, APRIL, 1984.

Service Level	Duluth/Superior[a]	Pacific Northwest[b]
	(cents/cwt.)	
Single-car	128	221
3-car/26/car M.O.[c]	124	207
26-car S.O.[d]	112	199
52-car	107	184

[a]Rates are applicable on wheat, corn, oats, soybeans, rye and sunflower shipments.

[b]Rates are applicable on wheat and rye shipments.

[c]3-car rates apply on Duluth/Superior movements. 26-car multiple origin (26-car M.O.) rates apply on Pacific Northwest movements.

[d]26-car single origin.

INVESTMENT ANALYSIS

Any capital investment which is required in order to utilize the lower rate must be capitalized based on the rate spread. A simple example will help to illustrate this relationship. First, assume that an elevator is shipping 300,000 bushels of wheat to D/S at 60 cents per hundredweight (36 cents per bushel) which is the 3-car rail rate. Further assume that the manager wishes to ship via the 26-car rate (a rate savings of 10 cents per cwt. or 6 cents per bushel) and that $100,000 must be invested in the facility in order to meet the 26-car loading requirements. Assuming that the investment can be financed at 14 percent, the necessary calculations are:

$$I^* = (V * S) - I(i)$$

where: I^* = investment criterion
V = volume
S = rate spread
I = investment required to upgrade
i = interest rate

Decision criterion:

If I^* is positive the rate spread justifies the investment.

If I^* is negative the rate spread does not justify the investment.

Substituting the above mentioned values:

$$I^* = (300{,}000 \text{ bu.} * \$0.06) - 100{,}000\ (.14)$$

$$= \$4{,}000$$

I^* is positive ($4,000), therefore the rate spread justifies the $100,000 investment.

This example illustrates the importance between utilizing a lower rate service level and the investment required to access the lower rate. However, it gives only a superficial view since factors such as competition, etc. are not taken into account. This type of analysis is applied to the Mohall elevator in Appendix II.

RAIL ABANDONMENT

The Mohall elevator is not located on a branch line that is currently being proposed for abandonment by the railroad providing service. The Board of Directors or potential investors should be fully aware of Burlington Northern's intentions concerning future service before any investments are made. Figure 1 is a map depicting the abandonment status of North Dakota rail segments.

Grain Volume Estimating Methodology

The "trade area" or region from which a country grain elevator is able to attract grain will vary in size depending on many factors. One of the most important of these factors is the freight rate (rail or truck) which can be utilized by the elevator to ship grain to terminal markets. The freight rate is the major factor in determining the difference between the terminal market price and the country grain elevator "board price" or price paid to farmers. Comparative costs of shipping from farms to competing elevators will also influence where producers haul grains. Other factors which will influence the grain volume available to an elevator are the density of grain production in the area, the physical road network in the region, elevator services available, and overall elevator management skills.

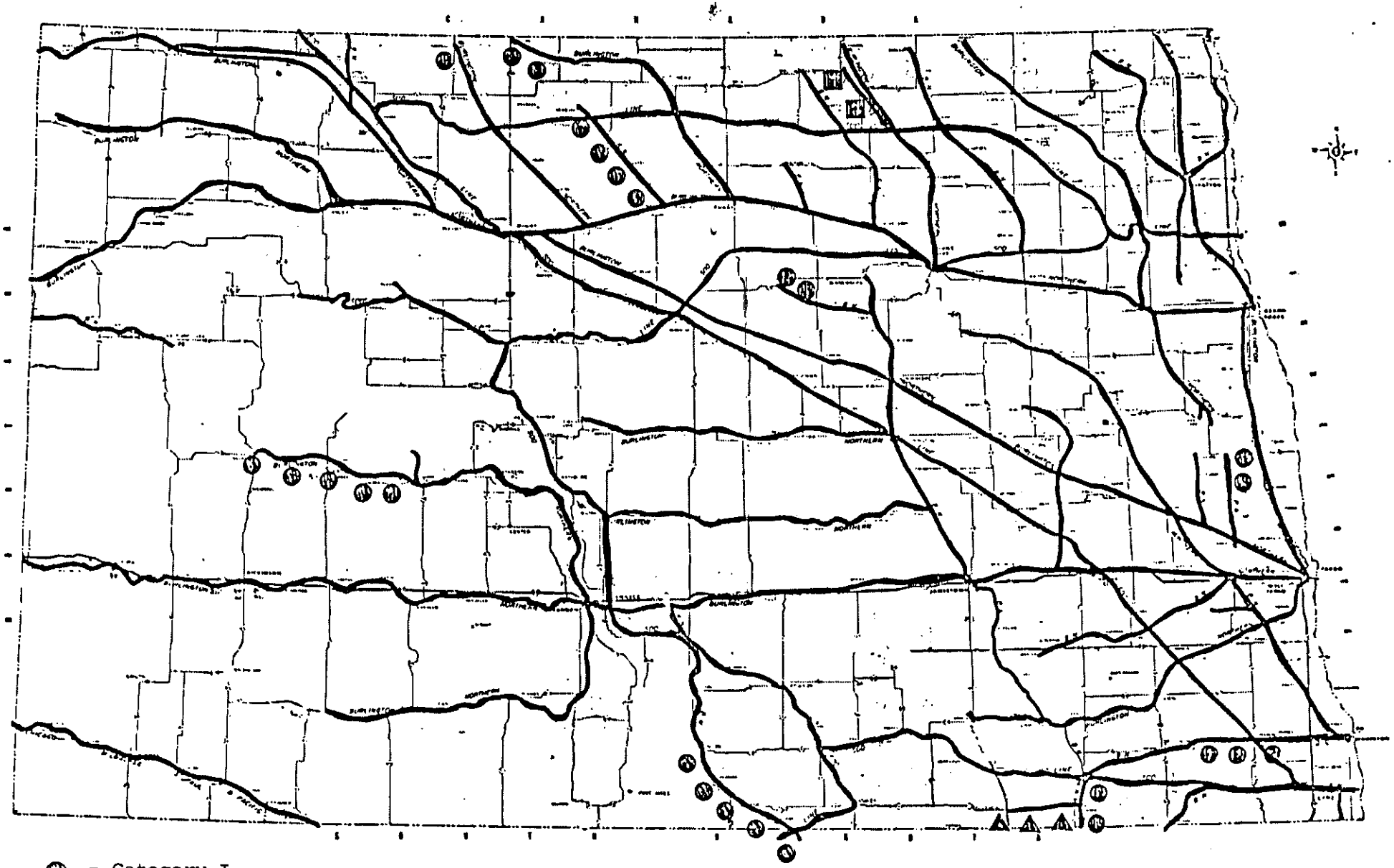
The methodology used herein utilizes comparative freight rates and distances to competing elevators to estimate the trade area of the Mohall grain elevator. It is presumed that a farmer's decision on where to ship his grain is affected by two variables: 1) the elevator "board price" (which is determined by the elevator's applicable

Figure 1. System Diagram Map for North Dakota.

4/1/84

EXISTING

North Dakota State Highway and Rail Network



- Category I
- Category II
- Category III

RAIL LINES

freight rate), and 2) the relative distances the producer must haul his grain by farm truck to area elevators. The "net farm price" or the net price per bushel received by a farmer will be equal to the elevator board price less costs of trucking from farm to elevator. The producer's net farm price can therefore be represented in mathematical notation as:

$$P_f = P_e - T\ (D)$$

where: P_f = net farm price

P_e = elevator board price

T = farm truck cost per unit of distance

D = distance from farm to elevator

At some point between two competing elevators, the net farm price of hauling to the two markets will equal. That is, the producer would be indifferent as to which elevator he would haul to -- his net price per bushel would be the same. This point where the net farm price is equal to both elevators would define the boundary of market areas. Producers on the "elevator A" side of this point would receive a higher price per bushel by shipping to elevator A than elevator B, and vice versa. For example, if the straight line distance between two elevators is 14 miles, some point along this 14 mile segment would exist where the net farm price to producers would be equal hauling to either elevator. Assuming a rail rate of 60 cents per hundredweight (cwt.) at both elevators, and a farm trucking cost of .35 cents per bushel-mile,[3] that point of equal net return can be identified as follows:

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[3]Griffin, Gene; Wesley Wilson; and Ken Casavant, "Characteristics and Costs of Operation of North Dakota's Farm Trucks," Upper Great Plains Transportation Institute, North Dakota State University, Fargo. Report forthcoming.

P_a - \$.0035/bushel-mile (X) = P_b \$.0035/bushel mile (14-X)

Using a terminal market price of one dollar (constant) at both elevators and applicable freight rates, the point of equal net return is:

$$.64 - .0035X = .64 - .0462 + .0035X$$

$$X = 7$$

Therefore, producers within seven miles of elevator A would be better off shipping grain to elevator A rather than to elevator B. In this case, the point of equal net return is midway between the two elevators because the applicable freight rates are the same for both elevators. The prodedure involved herein computes that point of equal producer returns for all elevators surrounding Mohall. The territory contained within the cellular shaped figure connecting these points would define the drawing territory or trade area of the Mohall elevator.

Mohall Trade Area Size and Volume

The primary criteria used by producers when deciding where to sell grain is price received. And, as prices among competing elevators change, producers will re-evaluate their net price they would receive by hauling to different markets. Therefore, it is critical to analyze effects of proposed price changes on an elevator's trade area and expected level of patronage. Competing elevators which are included in the analysis and elevator board prices which were offered are presented in Table 5. Estimates of the Mohall trade area volume are computed using the elevator board prices given in Table 5.

TABLE 5. GRAIN ELEVATORS INCLUDED IN THE MOHALL TRADE AREA ANALYSIS AND AVERAGE DURUM AND HRS WHEAT PRICES OFFERED, MID-APRIL, 1984.

Elevator	Grain Price Offered	
	HRS Wheat	Durum
	(dollars per bushel)	
Grano	3.545	3.55
Greene	3.606	3.683
Tolley	3.593	3.663
Loraine	3.59	3.916
Sherwood	3.59	3.546
Antler	3.666	3.69
Westhope	3.646	3.663
Newburg	3.713	3.716
Lansford	3.566	3.65
Glenburn	3.66	3.616
Mohall	3.56	3.55

It should be noted that the results depend heavily on the relative prices among elevators rather than the absolute levels of prices. If these relative prices change, the results will also change. Much of the following analysis involves changing these price relationships to study effects on the trade area if competing elevators react to various changes in the local competitive situation.

Grain Volume Estimate of the Mohall Elevator

Four situations were analyzed in estimating the grain drawing capabilities of the Mohall elevator. These four situations differ only in that different levels of multiple-car grain shipments are utilized. For example, under the first situation grain volume is estimated given current conditions existing in the Mohall area.

Under the second situation, Mohall is assumed to ship 33 percent of its durum, hard red spring (HRS) and sunflower to terminal markets in 52 car consignments. A summary of these four cases is presented in Table 6.

TABLE 6. PROPORTION OF HRS WHEAT, DURUM AND SUNFLOWER SHIPPED IN MULTIPLE CAR CONSIGNMENTS, MOHALL ELEVATOR.

Scenario	Consignment Size	Percent of Shipments		
		HRS Wheat	Durum	Sunflower
1	52	--	--	--
	26	--	--	--
2	52	33	33	33
	26	33	33	33
3	52	50	40	50
	26	25	40	25
4	52	75	50	75
	26	15	30	15

Scenario 1

Estimated grain volume under Scenario 1 was based on current conditions existing in the Mohall area. Actual HRS wheat prices offered by Mohall and competing elevators were used to estimate the size and shape of the Mohall elevator trade area. Also, distances between Mohall and competing elevators, as well as estimated farm truck transportation costs, were used to estimate trade area volume. Estimated grain volume contained in the Mohall trade area is presented in Table 7.

TABLE 7. ESTIMATED GRAIN VOLUME CONTAINED IN THE MOHALL ELEVATOR TRADE AREA, CURRENT SITUATION (SCENARIO 1).

Township	Township Production (% of County)	Percent of Township Contained in Trade Area	County Production	Trade Area Volume
Cutbank	2.5%	47.2%	10,006,705	188,879
Blaine	2.6%	1.4%	10,006,705	5,826
Brandon	6.4%	55.5%	8,961,499	318,317
Elay	4.3%	20.8%	8,961,499	80,152
Total				593,169

Total estimated trade area volume under current conditions was 593,169 bushels, consisting of HRS wheat, durum, barley, oats, sunflower, rye and flax. The majority of the grain volume is contained in Brandon Township (Renville County) and Cutbank Township (Bottineau County). These are the townships adjacent to the Renville-Bottineau county line. This estimate is approximately 100,000 bushels higher than actual grain volume handled at the Mohall elevator in 1982-83. This difference may be accounted for in the variation in relative grain prices among competing elevators and commodities throughout the season.

Scenario 2

Scenario 2 and the remaining analyses contain estimates of grain volume for the Mohall elevator assuming utilization of multiple-car shipments and associated rate savings. Rail freight savings resulting from multiple car shipments (Table 4) are analyzed as to their ability to compensate for increased costs associated with elevator purchase and upgrading. This freight savings would be apportioned out to pay for interest costs, amortize debt, and possibly be passed on to producers

as higher grain prices. In fact, it may be necessary to offer higher grain prices in order to attract higher grain volume thereby reducing per unit costs of operation. The grain volume estimates under Scenarios 2, 3, and 4 are based on estimates of the portion of the freight rate savings which can be offered to producers and the effects of that higher price on the Mohall elevator's total grain handle.

Annual costs of interest on debt were estimated under different conditions to analyze effects of interest rate levels, purchase cost and volume handled on the average interest cost per bushel. Total cost of upgrading the Mohall elevator to multiple car loading capabilities was estimated at $360,000 (see Appendix Table III). Average interest cost per bushel will vary depending on volume handled and interest rate applicable (Table 8). These interest cost estimates would vary as volume handled changed.

TABLE 8. INTEREST COSTS ASSOCIATED WITH FINANCIAL ELEVATOR UPGRADING COSTS OF $360,000, SELECTED INTEREST RATE LEVELS, MOHALL ELEVATOR.

Interest Rate (percent)	Total Annual Interest Cost (dollars)	Interest Cost Per Bushel[a] (cents)
8.75	31,500	1.58
10.00	36,000	1.80
11.00	39,600	2.00
12.50	45,000	2.25

[a]Assumes volume handled is two million bushels.

Costs of purchasing the Mohall elevator would also have an associated interest cost, depending on the level of financing. Assuming 100 percent financing, and a purchase cost of 300,000 dollars, interest costs per bushel would range from 1.3 to 1.9 cents per bushel (Table 9).

TABLE 9. INTEREST COSTS ASSOCIATED WITH FINANCING MOHALL ELEVATOR PURCHASE, SELECTED INTEREST RATE LEVELS.

Interest Rate (percent)	Total Annual Interest Cost[a] (dollars)	Interest Cost Per Bushel[b] (cents)
8.75	26,250	1.3
10.00	30,000	1.5
11.00	33,000	1.7
12.50	37,500	1.9

[a]Assumes purchase cost of 300,000 dollars.

[b]Assumes volume handled is two million bushels.

Interest costs rise as level of financing and interest rate increase. Interest cost per bushel may become unmanageably high if grain volume handled is not increased accordingly. The relationship between average interest cost per bushel and volume handled is presented in Figure 2.

Grain volume contained within the Mohall trade area was estimated assuming grain prices at Mohall were increased by 2.0 cents per bushel relative to competing elevators. This figure was estimated using a weighted average of rate savings achieved by shipping in multiple car lots and interest costs on purchase and upgrading costs.

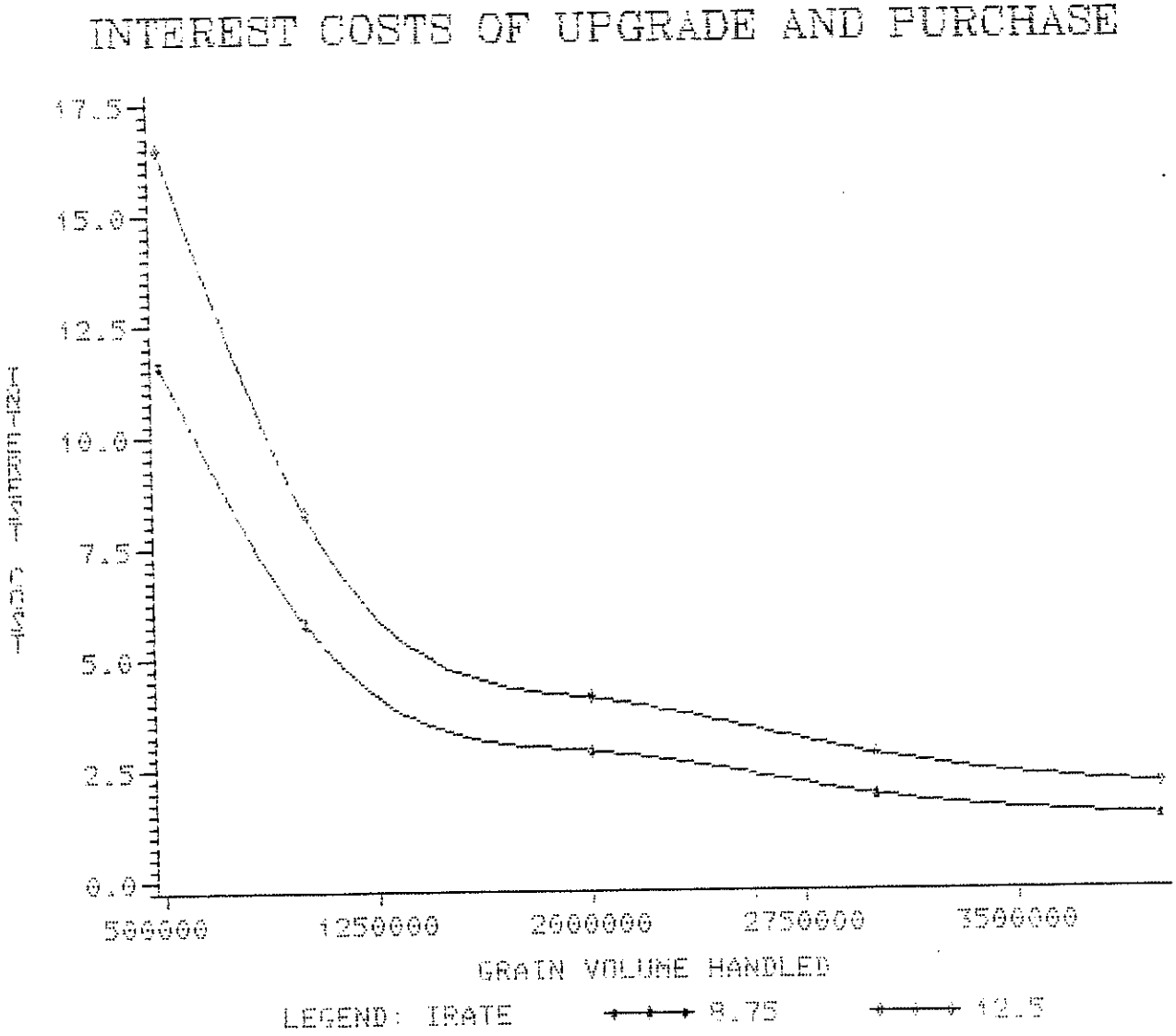
INTEREST COSTS OF UPGRADE AND PURCHASE
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
500000
1250000
2000000
2750000
3500000
GRAIN VOLUME HANDLED
LEGEND: IRATE
9.75
12.5

Figure 2.

Under Scenario 2, it was assumed that one-third of all durum, HRS wheat and sunflower was shipped in 52 car lots, one-third in 26 car lots, and one-third in consignments where no additional rate savings were realized. Therefore, a weighted average rate savings was estimated as follows:

Durum:

52 car savings	= .33(10.2)	= 3.4¢
26 car savings	= .33 (7.2)	= 2.4¢
Total savings		5.8¢

HRS Wheat:

52 car savings	= .33(13.8)	= 4.6¢
26 car savings	= .33 (4.8)	= 1.6¢
Total savings		6.2¢

Sunflower:

52 car savings	= .33(5.1)	= 1.7¢
26 car savings	= .33(3.6)	= 1.2¢
Total savings		2.9¢

If HRS wheat, durum and sunflower are handled in equal volumes, the average rate savings would be (5.8 + 6.2 + 2.9) ÷ 3 = 5.0¢ per bushel.

If interest costs are 3¢ per bushel, this leaves 5.0 - 3.0 = 2.0 cents per bushel for increases in prices offered to patrons, amortizing debt, or retained earnings.

This estimate was used to alter the relative grain prices and subsequently re-estimate grain volume available to the Mohall elevator. The price at Mohall was increased by 2.0 cents per bushel on HRS wheat, and grain volume estimated. The estimated grain volume contained in the Mohall trade area under these circumstances was 1,060,524 bushels (Table 10), more than double the volume actually handled at Mohall in 1982-83.

TABLE 10. ESTIMATED GRAIN VOLUME CONTAINED IN THE MOHALL ELEVATOR TRADE AREA, SCENARIO 2.

Township	Township Production (% of county)	Percent of Township Contained in Trade Area	County Production[a]	Trade Area Volume
Hoffman	2.4	2.8	16,006,705	10,756
Cutbank	2.5	72.2	16,006,705	288,921
Blaine	2.6	11.1	16,006,705	46,195
Hurley	5.0	2.7	8,961,499	12,098
Brandon	6.4	86.1	8,961,499	493,814
Hamlet	4.3	2.7	8,961,499	10,404
Elay	4.3	51.4	8,961,499	198,067
Grassland	3.0	0.1	8,961,499	269
Total				1,060,524

[a]Includes HRS wheat, durum, barley, oats, sunflower, flax and rye, three year average 1980-82.

Scenario 3

Under Scenario 3, grain volume contained in the Mohall trade area was estimated assuming additional savings could be achieved from increasing the proportion of grain shipped in multiple car consignments. Grain volume was estimated assuming grain prices at Mohall were increased by 3.2 cents per bushel (above Scenario 1). This estimate was calculated using a weighted average of rate savings achieved by shipping in multiple car lots and interest costs on purchase and upgrading costs.

Under Scenario 3, it was assumed that 40 percent of the durum, 50 percent of the HRS wheat and 50 percent of the sunflower handled was shipped in 52 car lots, while 40 percent of the durum, 25 percent of the HRS wheat and 25 percent of the sunflower was shipped in 26 car

lots. The remainder was assumed shipped in consignments where no additional rate savings were realized. A weighted average rate savings was estimated as follows:

Durum:

52 car savings = .4(10.2)	= 4.08¢
26 car savings = .4 (7.2)	= 2.88¢
Total savings	6.96¢

HRS Wheat:

52 car savings = .5(13.8)	= 6.9¢
26 car savings = .25(4.8)	= 1.2¢
Total savings	8.1¢

Sunflower:

52 car savings = .5(5.1)	= 2.6¢
26 car savings = .25(3.6)	= 0.9¢
Total savings	3.5¢

If HRS wheat and durum are handled in equal volumes, the average rate savings would be (6.96 + 8.1 + 3.5) ÷ 3 = 6.2¢ per bushel.

If interest costs are 3¢ per bushel, this leaves 6.2 - 3.0 = 3.2¢ per bushel for increases in prices offered to patrons, amortizing debt, or retained earnings.

This estimate was used to change the relative grain prices and estimate grain volume available to the Mohall elevator. After the price was increased by 3.2 cents per bushel at Mohall, estimated grain volume contained in the trade area was 1,439,840 bushels (Table 11), or almost triple the volume actually handled in 1982-83.

TABLE 11. ESTIMATED GRAIN VOLUME CONTAINED IN THE MOHALL ELEVATOR TRADE AREA, SCENARIO 3.

Township	Township Production (% of County)	Percent of Township Contained in Trade Area	County Production[a]	Trade Area Volume
Hoffman	2.4%	11.1%	16,006,705	42,642
Cutbank	2.5%	90.3	16,006,705	361,351
Blaine	2.6%	20.8	16,006,705	86,564
Hurley	5.0%	12.5	8,961,499	56,009
Brandon	6.4%	97.2	8,961,499	557,477
Hamlet	4.3%	15.3	8,961,499	58,958
Elay	4.3%	69.4	8,961,499	267,429
Grassland	3.0%	3.5	8,961,499	9,410
Total				1,439,840

[a]Includes HRS wheat, durum, barley, oats, sunflower, flax and rye, three year average, 1980-82.

Scenario 4

Under Scenario 4, prices at Mohall were increased further to analyze effects of increased multiple car shipments on total grain handled. Grain prices at Mohall were increased by 4.5 cents per bushel (above Scenario 1) and volume re-estimated. This 4.5 cents per bushel estimate was arrived at using a weighted average of rate savings achieved by shipping in multiple car lots and interest costs on purchase and upgrading costs.

Under Scenario 4, it was assumed that 50 percent of the durum, 75 percent of the HRS wheat and 75 percent of the sunflower handled was shipped in 52 car lots, while 30 percent of the durum, 15 percent of the HRS wheat and 15 percent of the sunflower handled was shipped in 26 car lots. The remainder was assumed shipped in consignments where no additional rate savings were realized. A weighted average rate savings was estimated as follows:

Durum:

52 car savings:	.5(10.2) =	5.10¢
26 car savings:	.3 (7.2) =	2.15¢
Total savings		7.26¢

HRS Wheat:

52 car savings:	.75(13.8) =	10.35¢
26 car savings:	.15 (4.8) =	0.72¢
Total savings		11.07¢

Sunflower:

52 car savings:	.75(5.1) =	3.8¢
26 car savings:	.15(3.6) =	0.5¢
Total savings		4.3¢

If HRS wheat and durum are handled in equal volumes, the average rate savings would be (7.26 + 11.07 + 4.3) ÷ 3 = 7.5¢ per bushel.

If interest costs are 3¢ per bushel, this leaves 7.5 - 3.0 = 4.5 per bushel for increases in prices offered to partons, amortizing debt, or retained earnings.

This 4.5¢ per bushel remainder was used as an estimate of the increase in prices at Mohall as a result of intensive use of multiple car grain shipments. The grain volume contained within the Mohall trade area after increasing price by 4.5¢ per bushel was 1,758,414 bushels (Table 12).

TABLE 12. ESTIMATED GRAIN VOLUME CONTAINED IN THE MOHALL ELEVATOR TRADE AREA, SCENARIO 4.

Township	Township Production (% of County)	Percent of Township Contained in Trade Area	County Production	Trade Area Volume
Hoffman	2.4	20.8	16,006,705	79,905
Cutbank	2.5	94.4	16,006,705	377,758
Renville	2.6	6.9	16,006,705	28,716
Blaine	2.6	29.2	16,006,705	121,522
Hurley	5.0	23.6	8,961,499	105,746
Brandon	6.4	100.0	8,961,499	573,536
Hamlet	4.3	33.3	8,961,499	128,320
Elay	4.3	83.1	8,961,499	320,221
Grassland	3.0	6.9	8,961,499	18,550
Lockwood	4.2	1.1	8,961,499	4,140
Total				1,758,414

Summary

The size and shape of an elevator's trade area will depend on many factors such as the competing elevator's prices, distances among elevators, and farmer's patronage. The amount of grain available for marketing within this trade area will depend on factors such as density of production and proportion of production actually shipped through country grain elevators.

The approximate size and shape of the Mohall trade area after upgrading to multiple-car loading capabilities is shown in Figure A-1 (Appendix). It's shape is determined primarily by competition from Greene, Lansford, Loraine, Antler and Newburg. The trade area size did change, however, as the relative prices at competing stations were altered to project effects of changes in multiple car utilization.

Table 13 is a summary of estimated grain volume contained in the Mohall trade area under different competitive circumstances.

It should be noted that the trade area and associated grain volume was estimated using HRS wheat prices at Mohall and competing elevators. Volume of all commodities was thereby estimated from this HRS wheat trade area. Using this trade area as an estimate for all commodities trade areas would be accurate to the extent that the relative competitiveness of Mohall in wheat merchandising reflects competitiveness in marketing other crops.

Investment analysis (Appendix Table II) was performed using multiple car rate savings on HRS wheat, durum, and sunflower. Other crops would not be as conducive to multiple car shipments due to their lower volumes or marketing characteristics. Therefore, no rate savings were included in the analysis for other crops.

TABLE 13. ESTIMATED TRADE AREA VOLUME UNDER VARIOUS LEVELS OF MULTIPLE CAR UTILIZATION, MOHALL GRAIN ELEVATOR.

Scenario	Commodity	Estimated Trade Area Volume
1 base case	HRS wheat	159,894
	Durum	195,364
	Barley	92,750
	Oats	46,114
	Rye	3,985
	Sunflower	89,685
	Flax	5,377
	Total	593,169
2 Dur 52-33%	HRS wheat	286,413
26-33%	Durum	349,003
HRS 52-33%	Barley	165,700
26-33%	Oats	82,571
SF 52-33%	Rye	7,101
26-33%	Sunflower	160,144
	Flax	9,588
	Total	1,060,520
3 DUR 52-40%	HRS wheat	383,796
26-40%	Durum	476,513
HRS 52-50%	Barley	226,148
26-25%	Oats	110,942
SF 52-50%	Rye	9,868
26-25%	Sunflower	219,321
	Flax	13,249
	Total	1,439,837
4 Dur 52-50%	HRS wheat	466,591
26-30%	Durum	583,072
HRS 52-75%	Barley	276,683
26-15%	Oats	135,002
SF 52-75%	Rye	12,147
26-15%	Sunflower	268,644
	Flax	16,277
	Total	1,758,416

Actual volume of grain handled depends on the relative prices at Mohall and competing stations, as well as other factors. However, given that Mohall does upgrade to multiple-car loading capabilities, the trade area volume can be expected to be approximately 1.0 to 1.7 million bushels. This range is consistent with Scenarios 2, 3 and 4 in Table 13.

This estimate of potential grain volume available for the Mohall elevator will provide a guideline or starting point for managers, board members and patrons to use when considering the potential for their elevator. Other factors which cannot be included in the analysis should be considered by the individual and evaluated as their effect on potential grain volume. Some of these other factors include:

1. Previous years handle
2. Road system
3. Producer patronage and loyalty
4. Ancillary services offered
5. Expected reactions of competing elevators
6. Merchandising skills of each elevator
7. Special rate considerations such as contract rates
8. Subjective views of management

APPENDIX TABLE I

Grain Movements from Mohall

1982-83

1981-82

1980-81

1979-80

1978-79

GRAIN MOVEMENT FROM MOHALL, 1982-83

	VARIABLE	SUM
COM=WHEAT	COM=WHEAT	DEST=DULUTH/SUPERIOR
	TOTBU	86941
	TRUCKBU	4187
	RAILBU	82754
COM=WHEAT	COM=WHEAT	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	119601
	TRUCKBU	69728
	RAILBU	49873
COM=WHEAT	COM=WHEAT	DEST=OTHER MINNESOTA
	TOTBU	42751
	TRUCKBU	763
	RAILBU	41988
COM=WHEAT	COM=WHEAT	DEST=SOUTHEASTERN STATES
	TOTBU	1376
	TRUCKBU	1376
	RAILBU	0
COM=WHEAT	COM=WHEAT	DEST=SOUTHWESTERN MIDLAND STATES
	TOTBU	708
	TRUCKBU	708
	RAILBU	0
COM=WHEAT	COM=WHEAT	DEST=PACIFIC NORTHWEST
	TOTBU	6061
	TRUCKBU	6061
	RAILBU	0
COM=WHEAT	COM=WHEAT	DEST=MISCELLANEOUS
	TOTBU	3370
	TRUCKBU	0
	RAILBU	3370
COM=DURUM	COM=DURUM	DEST=DULUTH/SUPERIOR
	TOTBU	51024
	TRUCKBU	14351
	RAILBU	36673
COM=DURUM	COM=DURUM	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	43569
	TRUCKBU	30259
	RAILBU	13310

	VARIABLE	SUM
COM=DURUM	COM=DURUM	DEST=OTHER MINNESOTA
	TOTBU	35900
	TRUCKBU	25960
	RAILBU	9940
COM=DURUM	COM=DURUM	DEST=MISCELLANEOUS
	TOTBU	3350
	TRUCKBU	0
	RAILBU	3350
COM=RYE	COM=RYE	DEST=DULUTH/SUPERIOR
	TOTBU	889
	TRUCKBU	889
	RAILBU	0
COM=RYE	COM=RYE	DEST=PACIFIC NORTHWEST
	TOTBU	4141
	TRUCKBU	4141
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	2534
	TRUCKBU	2534
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=DULUTH/SUPERIOR
	TOTBU	4486
	TRUCKBU	1059
	RAILBU	3427
COM=BARLEY	COM=BARLEY	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	895
	TRUCKBU	895
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=PACIFIC NORTHWEST
	TOTBU	18778
	TRUCKBU	18778
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=MISCELLANEOUS
	TOTBU	3835
	TRUCKBU	0
	RAILBU	3835

	VARIABLE	SUM
COM=OATS	COM=OATS DEST=MINNEAPOLIS/ST PAUL	
	TOTBU	30420
	TRUCKBU	30420
	RAILBU	0
COM=OATS	COM=OATS DEST=PACIFIC NORTHWEST	
	TOTBU	1447
	TRUCKBU	1447
	RAILBU	0
COM=SUNFLOWERS	COM=SUNFLOWERS DEST=DULUTH/SUPERIOR	
	TOTBU	2092
	TRUCKBU	2092
	RAILBU	0
COM=SUNFLOWERS	COM=SUNFLOWERS DEST=MINNEAPOLIS/ST PAUL	
	TOTBU	23032
	TRUCKBU	14232
	RAILBU	8800

GRAIN MOVEMENT FROM MOHALL, 1981-82

VARIABLE		SUM
COM=WHEAT	COM=WHEAT	DEST=DULUTH/SUPERIOR
	TOTBU	44094
	TRUCKBU	17639
	RAILBU	26455
COM=WHEAT	COM=WHEAT	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	98637
	TRUCKBU	88658
	RAILBU	9979
COM=WHEAT	COM=WHEAT	DEST=OTHER MINNESOTA
	TOTBU	17351
	TRUCKBU	7348
	RAILBU	10003
COM=WHEAT	COM=WHEAT	DEST=SOUTHEASTERN STATES
	TOTBU	7309
	TRUCKBU	734
	RAILBU	6575
COM=WHEAT	COM=WHEAT	DEST=SOUTHWESTERN MIDLAND STATES
	TOTBU	6640
	TRUCKBU	0
	RAILBU	6640
COM=WHEAT	COM=WHEAT	DEST=PACIFIC NORTHWEST
	TOTBU	71776
	TRUCKBU	35295
	RAILBU	36481
COM=WHEAT	COM=WHEAT	DEST=MISCELLANEOUS
	TOTBU	49582
	TRUCKBU	0
	RAILBU	49582
COM=DURUM	COM=DURUM	DEST=DULUTH/SUPERIOR
	TOTBU	119935
	TRUCKBU	14337
	RAILBU	105598
COM=DURUM	COM=DURUM	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	76248
	TRUCKBU	43877
	RAILBU	32371

	VARIABLE	SUM
COM=DURUM	COM=DURUM	DEST=OTHER MINNESOTA
	TOTBU	45068
	TRUCKBU	18679
	RAILBU	26389
COM=DURUM	COM=DURUM	DEST=SOUTHEASTERN STATES
	TOTBU	3280
	TRUCKBU	0
	RAILBU	3280
COM=DURUM	COM=DURUM	DEST=MISCELLANEOUS
	TOTBU	75210
	TRUCKBU	2363
	RAILBU	72847
COM=RYE	COM=RYE	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	2489
	TRUCKBU	2489
	RAILBU	0
COM=RYE	COM=RYE	DEST=OTHER MINNESOTA
	TOTBU	817
	TRUCKBU	817
	RAILBU	0
COM=RYE	COM=RYE	DEST=PACIFIC NORTHWEST
	TOTBU	1703
	TRUCKBU	1703
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	5693
	TRUCKBU	5693
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=OTHER MINNESOTA
	TOTBU	3284
	TRUCKBU	3284
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=DULUTH/SUPERIOR
	TOTBU	33563
	TRUCKBU	23221
	RAILBU	10342

	VARIABLE	SUM
COM=BARLEY	COM=BARLEY	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	34198
	TRUCKBU	2095
	RAILBU	32103
COM=BARLEY	COM=BARLEY	DEST=OTHER MINNESOTA
	TOTBU	9377
	TRUCKBU	5769
	RAILBU	3608
COM=BARLEY	COM=BARLEY	DEST=PACIFIC NORTHWEST
	TOTBU	12517
	TRUCKBU	12517
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=MISCELLANEOUS
	TOTBU	11400
	TRUCKBU	0
	RAILBU	11400
COM=OATS	COM=OATS	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	69573
	TRUCKBU	69573
	RAILBU	0
COM=OATS	COM=OATS	DEST=SOUTHWESTERN MIDLAND STATES
	TOTBU	2872
	TRUCKBU	2872
	RAILBU	0
COM=OATS	COM=OATS	DEST=PACIFIC NORTHWEST
	TOTBU	15716
	TRUCKBU	15716
	RAILBU	0
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=DULUTH/SUPERIOR
	TOTBU	100813
	TRUCKBU	59613
	RAILBU	41200
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	83920
	TRUCKBU	15260
	RAILBU	68660

	VARIABLE	SUM
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=OTHER MINNESOTA
	TOTBU	3852
	TRUCKBU	3852
	RAILBU	0
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=MISCELLANEOUS
	TOTBU	1792
	TRUCKBU	1792
	RAILBU	0

GRAIN MOVEMENT FROM MOHALL, 1980-81

	VARIABLE	SUM
COM=WHEAT	COM=WHEAT	DEST=DULUTH/SUPERIOR
	TOTBU	55976
	TRUCKBU	5093
	RAILBU	50883
COM=WHEAT	COM=WHEAT	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	46079
	TRUCKBU	26905
	RAILBU	19174
COM=WHEAT	COM=WHEAT	DEST=OTHER MINNESOTA
	TOTBU	34061
	TRUCKBU	25531
	RAILBU	8530
COM=WHEAT	COM=WHEAT	DEST=SOUTHEASTERN STATES
	TOTBU	2122
	TRUCKBU	2122
	RAILBU	0
COM=WHEAT	COM=WHEAT	DEST=PACIFIC NORTHWEST
	TOTBU	202076
	TRUCKBU	40146
	RAILBU	161930
COM=WHEAT	COM=WHEAT	DEST=MISCELLANEOUS
	TOTBU	3079
	TRUCKBU	0
	RAILBU	3079
COM=DURUM	COM=DURUM	DEST=DULUTH/SUPERIOR
	TOTBU	138043
	TRUCKBU	23671
	RAILBU	114372
COM=DURUM	COM=DURUM	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	36989
	TRUCKBU	6575
	RAILBU	30414
COM=DURUM	COM=DURUM	DEST=OTHER MINNESOTA
	TOTBU	34110
	TRUCKBU	27453
	RAILBU	6657

	VARIABLE	SUM
COM=DURUM	COM=DURUM	DEST=MISCELLANEOUS
	TOTBU	21878
	TRUCKBU	808
	RAILBU	21070
COM=RYE	COM=RYE	DEST=MISCELLANEOUS
	TOTBU	4564
	TRUCKBU	4564
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	11847
	TRUCKBU	11847
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=DULUTH/SUPERIOR
	TOTBU	9156
	TRUCKBU	0
	RAILBU	9156
COM=BARLEY	COM=BARLEY	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	31578
	TRUCKBU	0
	RAILBU	31578
COM=BARLEY	COM=BARLEY	DEST=OTHER MINNESOTA
	TOTBU	3550
	TRUCKBU	0
	RAILBU	3550
COM=BARLEY	COM=BARLEY	DEST=PACIFIC NORTHWEST
	TOTBU	41289
	TRUCKBU	37748
	RAILBU	3541
COM=BARLEY	COM=BARLEY	DEST=MISCELLANEOUS
	TOTBU	59186
	TRUCKBU	23636
	RAILBU	35550
COM=OATS	COM=OATS	DEST=PACIFIC NORTHWEST
	TOTBU	32058
	TRUCKBU	32058
	RAILBU	0

VARIABLE	SUM
COM=OATS COM=OATS DEST=MISCELLANEOUS	
TOTBU	10971
TRUCKBU	10971
RAILBU	0
COM=SUNFLOWERS COM=SUNFLOWERS DEST=DULUTH/SUPERIOR	
TOTBU	65688
TRUCKBU	65688
RAILBU	0
COM=SUNFLOWERS COM=SUNFLOWERS DEST=MINNEAPOLIS/ST PAUL	
TOTBU	83192
TRUCKBU	43192
RAILBU	40000
COM=SUNFLOWERS COM=SUNFLOWERS DEST=OTHER MINNESOTA	
TOTBU	21170
TRUCKBU	21170
RAILBU	0
COM=SUNFLOWERS COM=SUNFLOWERS DEST=PACIFIC NORTHWEST	
TOTBU	12700
TRUCKBU	0
RAILBU	12700
COM=SUNFLOWERS COM=SUNFLOWERS DEST=MISCELLANEOUS	
TOTBU	11596
TRUCKBU	11596
RAILBU	0

GRAIN MOVEMENT FROM MOHALL, 1979-80

VARIABLE		SUM
COM=WHEAT	COM=WHEAT	DEST=DULUTH/SUPERIOR
	TOTBU	85988
	TRUCKBU	32408
	RAILBU	53580
COM=WHEAT	COM=WHEAT	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	134760
	TRUCKBU	108170
	RAILBU	26590
COM=WHEAT	COM=WHEAT	DEST=OTHER MINNESOTA
	TOTBU	120648
	TRUCKBU	94224
	RAILBU	26424
COM=WHEAT	COM=WHEAT	DEST=SOUTHWESTERN MIDLAND STATES
	TOTBU	2140
	TRUCKBU	0
	RAILBU	2140
COM=WHEAT	COM=WHEAT	DEST=PACIFIC NORTHWEST
	TOTBU	40549
	TRUCKBU	6729
	RAILBU	33820
COM=WHEAT	COM=WHEAT	DEST=MISCELLANEOUS
	TOTBU	7361
	TRUCKBU	0
	RAILBU	7361
COM=DURUM	COM=DURUM	DEST=DULUTH/SUPERIOR
	TOTBU	268722
	TRUCKBU	95800
	RAILBU	172922
COM=DURUM	COM=DURUM	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	129108
	TRUCKBU	71773
	RAILBU	57335
COM=DURUM	COM=DURUM	DEST=OTHER MINNESOTA
	TOTBU	49748
	TRUCKBU	32675
	RAILBU	17073

	VARIABLE	SUM
COM=DURUM	COM=DURUM	DEST=SOUTHEASTERN STATES
	TOTBU	845
	TRUCKBU	845
	RAILBU	0
COM=DURUM	COM=DURUM	DEST=MISCELLANEOUS
	TOTBU	37858
	TRUCKBU	5159
	RAILBU	32699
COM=RYE	COM=RYE	DEST=DULUTH/SUPERIOR
	TOTBU	10747
	TRUCKBU	10747
	RAILBU	0
COM=RYE	COM=RYE	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	2751
	TRUCKBU	2751
	RAILBU	0
COM=RYE	COM=RYE	DEST=PACIFIC NORTHWEST
	TOTBU	12749
	TRUCKBU	12749
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	21540
	TRUCKBU	21540
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=OTHER MINNESOTA
	TOTBU	815
	TRUCKBU	815
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=DULUTH/SUPERIOR
	TOTBU	12077
	TRUCKBU	8393
	RAILBU	3684
COM=BARLEY	COM=BARLEY	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	21071
	TRUCKBU	10128
	RAILBU	10943

	VARIABLE	SUM
COM=BARLEY	COM=BARLEY	DEST=PACIFIC NORTHWEST
	TOTBU	23658
	TRUCKBU	23658
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=MISCELLANEOUS
	TOTBU	143105
	TRUCKBU	58191
	RAILBU	84914
COM=OATS	COM=OATS	DEST=SOUTHWESTERN MIDLAND STATES
	TOTBU	10408
	TRUCKBU	10408
	RAILBU	0
COM=OATS	COM=OATS	DEST=PACIFIC NORTHWEST
	TOTBU	131140
	TRUCKBU	131140
	RAILBU	0
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=DULUTH/SUPERIOR
	TOTBU	128296
	TRUCKBU	111796
	RAILBU	16500
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=OTHER MINNESOTA
	TOTBU	12252
	TRUCKBU	12252
	RAILBU	0
COM=SUNFLOWERS	COM=SUNFLOWERS	DEST=MISCELLANEOUS
	TOTBU	13244
	TRUCKBU	13244
	RAILBU	0

GRAIN MOVEMENT FROM MOHALL, 1978-79

	VARIABLE	SUM
COM=WHEAT	COM=WHEAT	DEST=DULUTH/SUPERIOR
	TOTBU	230393
	TRUCKBU	75271
	RAILBU	155122
COM=WHEAT	COM=WHEAT	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	111136
	TRUCKBU	95226
	RAILBU	15910
COM=WHEAT	COM=WHEAT	DEST=OTHER MINNESOTA
	TOTBU	79249
	TRUCKBU	21691
	RAILBU	57558
COM=WHEAT	COM=WHEAT	DEST=PACIFIC NORTHWEST
	TOTBU	14265
	TRUCKBU	686
	RAILBU	13579
COM=WHEAT	COM=WHEAT	DEST=MISCELLANEOUS
	TOTBU	8466
	TRUCKBU	0
	RAILBU	8466
COM=DURUM	COM=DURUM	DEST=DULUTH/SUPERIOR
	TOTBU	403206
	TRUCKBU	167787
	RAILBU	235419
COM=DURUM	COM=DURUM	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	884139
	TRUCKBU	846148
	RAILBU	37991
COM=DURUM	COM=DURUM	DEST=OTHER MINNESOTA
	TOTBU	14949
	TRUCKBU	1882
	RAILBU	13067
COM=DURUM	COM=DURUM	DEST=SOUTHWESTERN MIDLAND STATES
	TOTBU	3314
	TRUCKBU	0
	RAILBU	3314

	VARIABLE	SUM
COM=DURUM	COM=DURUM	DEST=MISCELLANEOUS
	TOTBU	48189
	TRUCKBU	738
	RAILBU	47451
COM=RYE	COM=RYE	DEST=DULUTH/SUPERIOR
	TOTBU	3791
	TRUCKBU	3791
	RAILBU	0
COM=RYE	COM=RYE	DEST=OTHER MINNESOTA
	TOTBU	1819
	TRUCKBU	1819
	RAILBU	0
COM=RYE	COM=RYE	DEST=PACIFIC NORTHWEST
	TOTBU	12015
	TRUCKBU	12015
	RAILBU	0
COM=FLAX	COM=FLAX	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	33163
	TRUCKBU	33163
	RAILBU	0
COM=BARLEY	COM=BARLEY	DEST=DULUTH/SUPERIOR
	TOTBU	10040
	TRUCKBU	1119
	RAILBU	8921
COM=BARLEY	COM=BARLEY	DEST=MINNEAPOLIS/ST PAUL
	TOTBU	13302
	TRUCKBU	0
	RAILBU	13302
COM=BARLEY	COM=BARLEY	DEST=OTHER MINNESOTA
	TOTBU	4260
	TRUCKBU	0
	RAILBU	4260
COM=BARLEY	COM=BARLEY	DEST=SOUTHEASTERN STATES
	TOTBU	24855
	TRUCKBU	0
	RAILBU	24855

VARIABLE	SUM
COM=BARLEY COM=BARLEY DEST=SOUTHWESTERN MIDLAND STATES	
TOTBU	3712
TRUCKBU	0
RAILBU	3712
COM=BARLEY COM=BARLEY DEST=PACIFIC NORTHWEST	
TOTBU	5546
TRUCKBU	5546
RAILBU	0
COM=BARLEY COM=BARLEY DEST=MISCELLANEOUS	
TOTBU	239591
TRUCKBU	102613
RAILBU	136978
COM=OATS COM=OATS DEST=DULUTH/SUPERIOR	
TOTBU	6043
TRUCKBU	6043
RAILBU	0
COM=OATS COM=OATS DEST=MINNEAPOLIS/ST PAUL	
TOTBU	13610
TRUCKBU	10242
RAILBU	3368
COM=OATS COM=OATS DEST=SOUTHWESTERN MIDLAND STATES	
TOTBU	4047
TRUCKBU	4047
RAILBU	0
COM=OATS COM=OATS DEST=PACIFIC NORTHWEST	
TOTBU	88193
TRUCKBU	88193
RAILBU	0
COM=OATS COM=OATS DEST=MISCELLANEOUS	
TOTBU	5533
TRUCKBU	2721
RAILBU	2812
COM=SUNFLOWERS COM=SUNFLOWERS DEST=DULUTH/SUPERIOR	
TOTBU	48954
TRUCKBU	45430
RAILBU	3524
COM=SUNFLOWERS COM=SUNFLOWERS DEST=OTHER MINNESOTA	
TOTBU	6555
TRUCKBU	6555
RAILBU	0

APPENDIX TABLE II

Investment Analysis Using Trade Area

Grain Volume Estimates

Investment Analysis

$$I^* = [(VOL_1 \times SPR_1) + (VOL_2 \times SPR_2) + ... + (VOL_n \times SPR_n)] - INV\ (i)$$

I^* = investment criteria

VOL_1 = expected volume of commodity 1

VOL_2 = expected volume of commodity 2

VOL_n = expected volume of commodity n

SPR_1 = rate savings (spread) on commodity 1

SPR_2 = rate savings (spread) on commodity 2

SPR_n = rate savings (spread) on commodity n

INV = level of investment required

i = interest rate or desired return on investment

Calculations of I^* in the following four scenarios are based on the investment analysis detailed on page 11. In Scenario 1, no rate spread is used since it is the "current" situation. Scenarios 2, 3 and 4 are based on alternative utilization levels of multiple car shipments. In each case VOL_1 pertains to HRS, VOL_2 to durum and VOL_3 to sunflower (see Table 13 for grain volumes used in each scenario). VOL_1, VOL_2 and VOL_3 were weighted depending on the propotion of each grain that was shipped under a particular service level (see Table 13 for these proportions).

Scenario 1

$$I^* = (593,169 * 0) - \$300,000\ (.12)^a$$

$$= \$0 - \$36,000$$

$$= - \$36,000$$

Scenario 2

$$I^* = [.33(286,413)(.048) + .33(286,413)(.138) + .33(349,003)(.022) + .33(349,003)(.102) + .33(160,144)(.072) + .33(160,144)(.102)] - \$650,000(.12)^b$$

$$= \$4,537 + \$13,043 + \$8,292 + \$11,747 + \$3,805 + \$5,390 - \$78,000$$

$$= \$46,814 - \$78,000$$

$$= -\$31,186$$

Scenario 3

$$I^* = [.25(383,796)(.048) + .50(383,796)(.138) + .40(476,513)(.022) + .40(476,513)(.102) + .25(219,321)(.072) + .50(219,321)(.102)] - \$650,000\ (.12)^b$$

$$= \$4,606 + \$26,482 + \$13,724 + \$19,442 + \$3,948 + \$11,815 - \$78,000$$

$$= \$79,387 - 78,000$$

$$= \$1,387$$

Scenario 4

$$I^* = [.15(466,591)(.048) + .75(466,591)(.138) + .30(583,072)(.072) + .50(583,072)(.102) + .15(268,644)(.072) + .75(268,644)(.102)] - \$650,000\ (.12)^b$$

$$= \$3,359 + \$48,292 + \$12,594 + \$29,763 + \$2,901 + \$20,551 - \$78,000$$

$$= \$117,460 - \$78,000$$

$$= \$39,460$$

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[a] $300,000 represents the purchase price of the elevator.

[b] $650,000 represents $300,000 for purchase and $350,000 for upgrading the elevator to a multiple car loading facility (26-car single origin or 52-car service level).

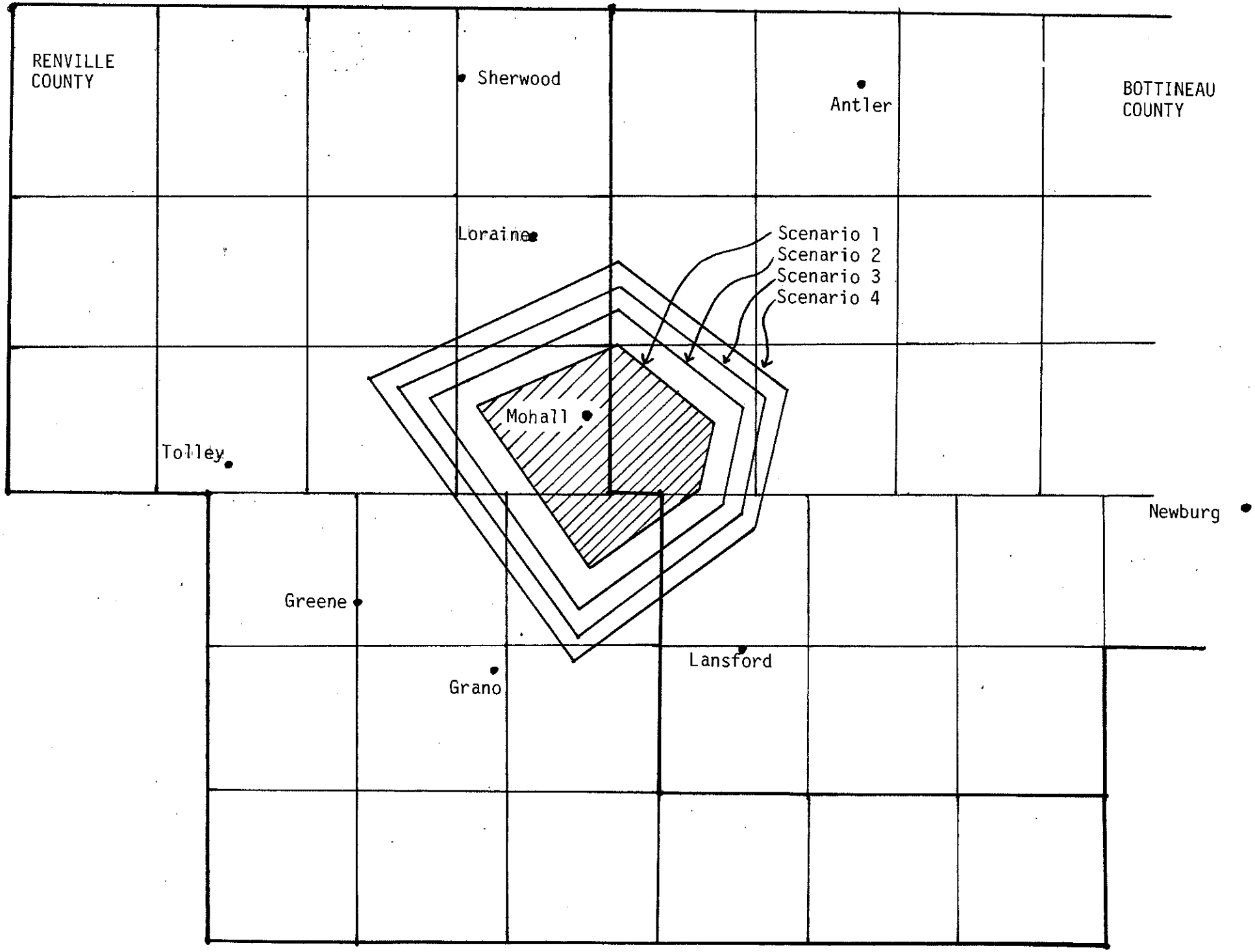
APPENDIX TABLE III

Estimated Costs of Upgrading Mohall Elevator

to Multiple Car Capabilities

ESTIMATED COSTS OF UPGRADING MOHALL ELEVATOR
TO MULTIPLE CAR CAPABILITIES

Cost Component	$
Trackage	50,000
Bins	130,000
Track Scale	30,000
Interior Scale	45,000
Legs	70,000
Car Mover	35,000
Total	360,000



Appendix Figure 1. Approximate Size and Shape of the Mohall Trade Area Under Various Competitive Conditions.