A Preliminary Review of Impacts on Washington County Roads of Grain Transportation Changes

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16. Abstract

This preliminary study identified the impact on county roads of changes in the grain transportation system. County engineers were surveyed in a 10 county study area in eastern Washington to identify the location, cause and magnitude of these impacts. It was found that railline abandonment and traffic to multiple car loading facilities were principal causes. Total needs were estimated by the county engineers to be about $1.5 billion, abot $219 million per county for the seven responding counties. Specific impacts caused by grain transportation changes could range up to 60-70% of that value, based on preliminary analysis in two of the counties. These preliminary estimates lacked hard data; the forthcoming RJC study should give a more specific estimate of that impact. As private decisions continue to impact public infrastructure, new funding processes may be needed.

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FINAL REPORT

Research Project Y-3400, Task 6

PREPARED FOR

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The contents of this report reflect the view of the authors who are responsible for the facts and the accuracy of the data presented therein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the Federal Highway Administration. This report does not constitute a standard specification or regulation.

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Summary

County roads, primarily in eastern Washington, are being physically impacted by changes in the grain transportation system in Washington. County roads are a vital link in moving grain since most farms and many grain storage facilities are located on county roads. Often, these county roads provide the most direct route to a river terminal or multiple car loading facility. The overall goal of this study was to preliminarily identify the location, cause and financial magnitude of damage to county roads caused by the changes in grain transportation.

Ten counties in eastern Washington, producing almost 90 percent of the state's wheat, were selected for this study. The analysis was based on a literature review, survey data from previous studies of elevators and farmers in the area, use of published agricultural and transportation statistics, and personal interviews and telephone follow-ups with county road engineers and elevator operators.

It was determined that the "problem roads" identified by the county road engineers, while spread throughout the study area, were directly related to changes in transportation patterns of grain traffic. The cause or source of damage, examined in detail for two counties, revealed the same correlation. Railline abandonment caused about $5 million (27 percent) and $6 million (15 percent) of damage to roads in Lincoln and Spokane Counties, respectively. Traffic to multiple car loading facilties added another $10 million and $6 million, respectively. The most common cause of damage to roads was overloading of trucks, with wet roads and farm tractors being two other sources of damage.

The overall problem was that the majority of the roads in these grain producing counties had been built 40 or more years ago, and had

been designed for much smaller and lighter loads than the current traffic patterns. The total estimated financial need to repair roads was about $1.5 billion, an average of $219 million per county.

It is evident as these private firms (elevators, railroads, etc.) continue to make decisions based on efficiency, competition and profitability, substantial hidden costs are being incurred by the public. Government and public decisionmakers may need to treat transportation as a system rather than as individual competing modes. Such an approach may entail cross-modal provision of infrastructure, rather than traditional formula funding.

Introduction

The changing grain transportation and marketing system in the state of Washington may be having significant impacts on some areas of the state roadway system. These changes have resulted from the abandonment of 1,600 miles of rail lines since 1970, a dramatic increase in the number of multiple car loading facilities (MCLF), a shift in grain traffic patterns and increased transshipment between county elevators. County roads, primarily in eastern Washington, are a vital link in the transportation system moving grain since most farms and many grain storage facilities are located on county roads and provide the most direct route to a river terminal or MCLF. A county road is generally considered any road, asphalt, hard surfaced, gravel or dirt, for which the responsibility for construction, maintenance and repair rests with county government. The above changes suggest that county roads may be impacted to a considerable degree by changes in the grain transportation system.

Objectives

The overall goal of this study was to preliminarily identify the extent of impact on county roads caused by the grain transportation changes. Specific objectives were:

(1) to identify those segments of county roads which are directly impacted by changes in the grain transportation system,

(2) to determine the financial costs to the counties of maintaining and repairing impacted roads, and

(3) to determine the specific source or cause of each impact.

Study Approach

The information necessary to evaluate the impact of grain transportation on local roads came from various sources. These included: a literature review, survey data from previous studies of grain elevator operations and of farmers in two grain producing counties, use of published agricultural and transportation statistics, and personal interviews and telephone follow-ups with county road engineers and elevator operators.

Ten counties in eastern Washington were selected for this study. These counties are the state's largest producers of grain and account for nearly 90 percent of Washington wheat. The study area was chosen because it would provide the most accurate estimates of the magnitude of the impacts of changes in grain transportation throughout the state.

Data from two previous studies by the Department of Agricultural Economics at Washington State University were examined to identify road segments which may be affected by grain hauling. These studies included surveys of grain elevator operators across Washington State (Hays, 1986) and grain farmers in Grant and Lincoln Counties (Dooley and Casavant, 1983). The primary data available from these studies identified the location and size of grain storage and transportation facilities, the primary mode of transportation used by each and the existing traffic pattern from each facility.

Road engineers for each county in the study area were then surveyed through personal interviews. The purpose of the survey was to obtain the engineers' insights into which roads were being affected in their county, the source of the impact, and the costs associated with those impacts. The engineers were first contacted with a letter explaining

the purpose of the research project. This was followed by a telephone call to schedule the time and date of the interview. The interviews consisted of a discussion of road conditions throughout the county and completion of an interview questionnaire (see Appendix). The results reflected the county engineers perceptions of needs, sometimes based on hard data, other times not. The information recorded on the interview forms was later combined into a computer data base for further analysis.

A list of the MCLF operators throughout the study area was compiled from both the county engineer and grain elevator surveys. The operators were then interviewed by telephone during February 1987. The purpose of these interviews was to ascertain which roads serve the particular facilities, the general condition of those roads and any specific problem areas that have arisen.

Study Area

The counties which make up the study area are Adams, Benton, Columbia, Douglas, Franklin, Grant, Lincoln, Spokane, Walla Walla, and Whitman. The study area is identified in Figure 1. The 10 counties selected for this study had a combined wheat production in 1984 of approximately 142,831,000 bushels, 89 percent of the total Washington wheat production of 160,350,000 bushels for the year. The counties also produced nearly 86 percent of the state's 63,700,000 bushel barley crop (Washington Agricultural Statistics, 1984). Considerable differences do exist between the counties, as revealed by the following.

Descriptive statistics for each county, including 1984 urban and rural population, land area, and population density, are provided in Table 1.

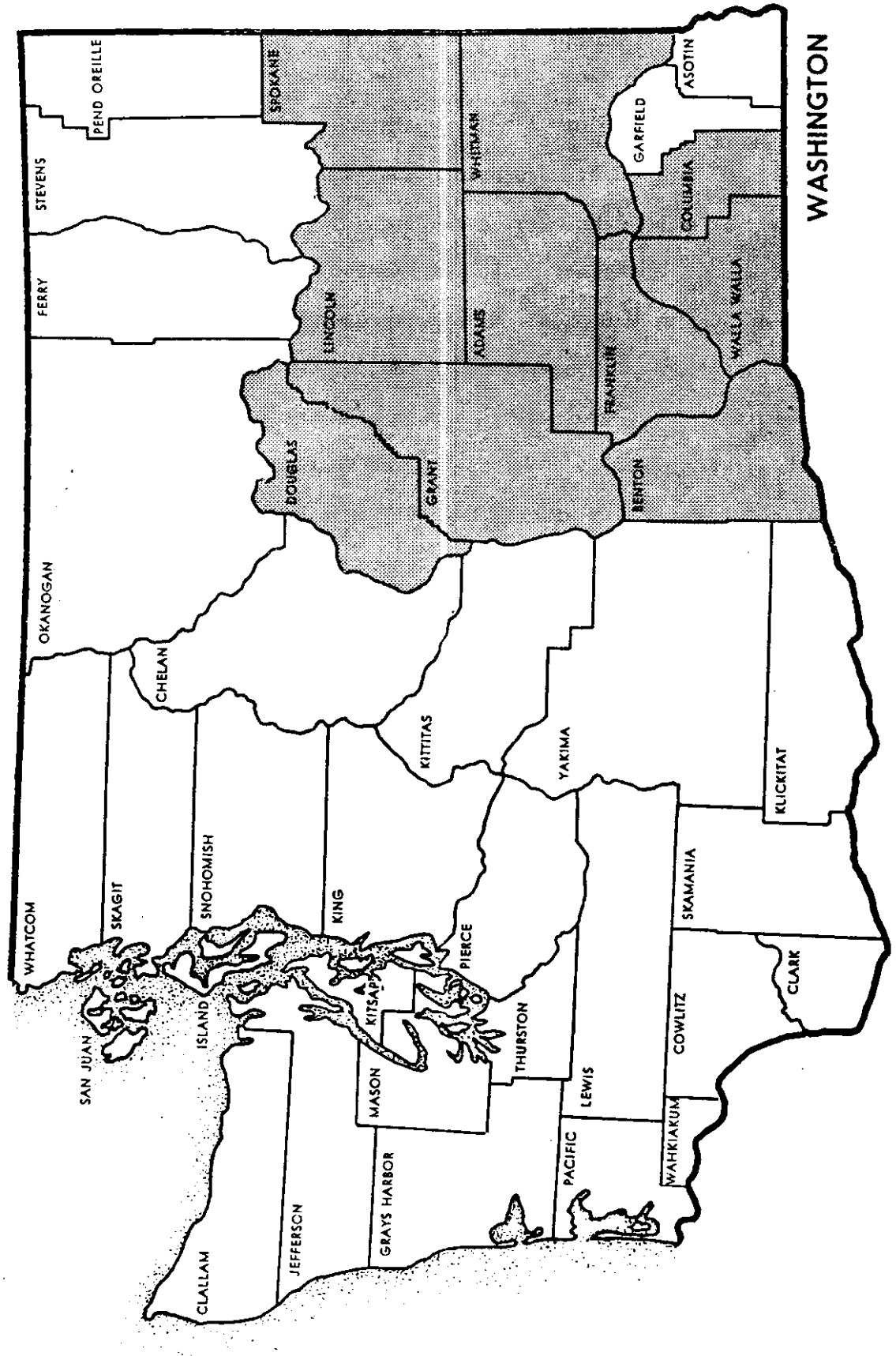


Figure 1. Study Area (shaded portion)

Table 1

Selected Demographic Characteristics of the Study Area by County, 1984

County	Population				Land Area	Density
	Urban	Rural	Total	% Rural	Sq. Miles	Pop./Mile
Adams	7,511	6,289	13,800	.45	1,922	7.2
Benton	77,138	28,062	105,200	.27	1,715	61.3
Columbia	2,855	1,245	4,100	.30	864	4.7
Douglas	4,840	18,060	22,900	.79	1,817	12.6
Franklin	21,245	14,455	35,700	.41	1,243	28.7
Grant	27,004	22,896	49,900	.46	2,660	18.8
Lincoln	5,965	3,735	9,700	.39	2,310	4.2
Spokane	190,716	163,584	354,300	.47	1,764	200.9
Walla Walla	32,970	15,430	48,400	.32	1,261	38.4
Whitman	31,773	7,827	39,600	.20	2,151	18.4
Total	402,017	281,583	683,600	.41	17,707	38.6

Source: Washington State Data Book, 1985.

The study area covers 17,707 square miles in eastern Washington, roughly one-fourth of the entire state. Of this, approximately 3,345,000 acres (5,227 square miles) were planted in wheat or barley in 1984. Total land area by county averages 1,771 square miles compared to the state average per county of 1,705 square miles. Columbia County is the smallest with a total land area of 864 square miles while Grant County is the largest with 2,660 square miles.

There is tremendous variation among the counties in terms of population density. Lincoln County is the lowest with only 4.2 people per square mile, compared to Spokane County, the highest, which has 200.9 people per square mile. The average for all 10 counties is 38.6 people per square mile. The high population of Spokane County is due primarily to the City of Spokane and is not characteristic of the region. When Spokane County is deleted from the totals, the average population density falls to 20.7, which is more representative of the

grain producing regions of eastern Washington. In either case, the average population density is significantly less than the estimated state average for 1985 of 65.9 people per square mile (Washington State Data Book, 1985). The low population base of these counties has both positive and negative effects on those county's road systems. An important positive effect is the lower level of automobile and service vehicle traffic than the more populated regions of the state. However, the low population also limits each county's tax base, resulting in low levels of local funding for county roads.

Agricultural production is the main industry in all of the counties surveyed. Along with its production of grain, the region produces livestock and a variety of fruits and vegetables on both irrigated and dryland farms. Tree fruits are grown in Benton, Douglas, Franklin, Grant, and Walla Walla Counties. These counties, along with Adams, Columbia, and Whitman Counties, are also important producers of other fruits and vegetables including grapes, sweet corn, potatoes, green peas, onions, and asparagus. Many of these crops are grown on irrigated farmland, found in all 10 counties.

The Columbia Basin Irrigation Project accounts for most of the irrigated farmland in the 10 county area. Grant County contains the largest irrigated area of the group with approximately 820,614 irrigated acres. Adams and Lincoln Counties have 532,239 and 440,160 irrigated acres, respectively, while Benton and Franklin Counties each have slightly over 350,000 acres under irrigation. Spokane County has the least amount of irrigated land, approximately 93,000 acres (Washington State Data Book, 1985).

Study Results

The quality of county road systems is largely dependent upon the decision process of county officials in allocating resources as well as the magnitude of resources available for allocation. When asked about recent changes in their decision making processes, many of the engineers reported positive steps towards a better understanding of, and planning for, the particular problems of grain transportation. Developing a closer working relationship with farmers and grain handlers was one of these steps. By surveying grain handlers and meeting with farmer organizations, county road engineers are able to identify grain routes over county roads and foresee potential problems (a similar framework for monitoring impacts on state highways was suggested in Borris et al., 1986). This also provides county engineers with an opportunity to educate grain haulers to the problems of maintaining grain routes and the importance of respecting load restrictions and other constraints.

Another development which the engineers planned to use at the county level was the Pavement Management System. The primary purpose of the program, sponsored by the County Road Administration Board (CRAB), is balancing of priority needs to available resources to attain efficient usage of limited dollars. When implemented, this system should allow the engineer to rate the condition of short road segments through a comprehensive set of tests and then enter this data into a microcomputer program. The program can then be used to monitor those segments over time and to highlight potential problem areas quickly.

General Road Conditions

Specific information dealing with the condition of roads in the counties, and factors leading to any individual road deterioration, was developed. The general overall problem consistently mentioned by the engineers was that the majority of the roads in the grain producing counties had been built 40 or more years ago, and had been constructed for much smaller vehicles and lighter loads than the existing typical traffic hauls. In many cases, the existing road beds are too narrow for wide wheel bases of semi and tandem axle trucks, causing road edge break up. These problems, combined with the high cost of maintaining and rebuilding hard surfaced, bituminous surface treatment (BST) roads, was, and is, a primary factor in the deterioration of county road systems.

Each of the county engineers was asked to subjectively rate the condition of the roads in their county on a scale of excellent, good, fair, poor, or very poor, and to describe how, if any, that condition has changed over the past five years.

Overall, the roads were perceived to be in only fair to poor condition (Table 2). The highest rating, fair to good, was in Benton County, while the lowest rating was poor to very poor in Douglas County. No county engineer indicated his roads were in excellent condition. The overall change reported in road conditions was a slight decline. Only one county, Lincoln, reported a general improvement in road conditions while three reported no change and six reported a decline (five reported a decline, and one reported a great decline).

Table 2

Road Condition and Change in Condition by County

County	Road Condition	Change in Condition
Adams	Fair	Declined
Benton	Good/Fair	Remained Constant
Columbia	Fair	Remained Constant
Douglas	Poor/Very Poor	Declined Greatly
Franklin	Fair	Declined
Grant	Fair/Poor	Declined
Lincoln	Fair	Improved
Spokane	Fair	Remained Constant
Walla Walla	Fair	Declined
Whitman	Poor	Declined

Source: County Road Engineer Survey, 1986.

The engineers were also asked to estimate the level of funding they would require to bring all of their roads to a "satisfactory condition," irrespective of the cause of the existing condition. Satisfactory was defined as roads that could meet the demands of existing traffic patterns. Although rebuilding costs do vary by road and by county, most of the engineers reported an average rebuilding cost for a BST road, from its present condition, of approximately $200,000 per mile. The major exception to this statement was Lincoln County which based its estimates on a $100,000 average rebuilding cost, reflecting their perspective of better conditions of their roads.

The total estimate for the seven responding counties was slightly over $1.5 billion (Table 3). The estimates ranged from $104 million for Benton County to $485 million for Whitman County. The average for those counties providing estimates was $219 million. These figures include new construction, rebuilding roads and bridges, and upgrading from gravel to a hard surface. Although these figures have a wide range,

they do reflect the general condition of the individual county's roads and the huge funding problem faced by those counties.

Table 3

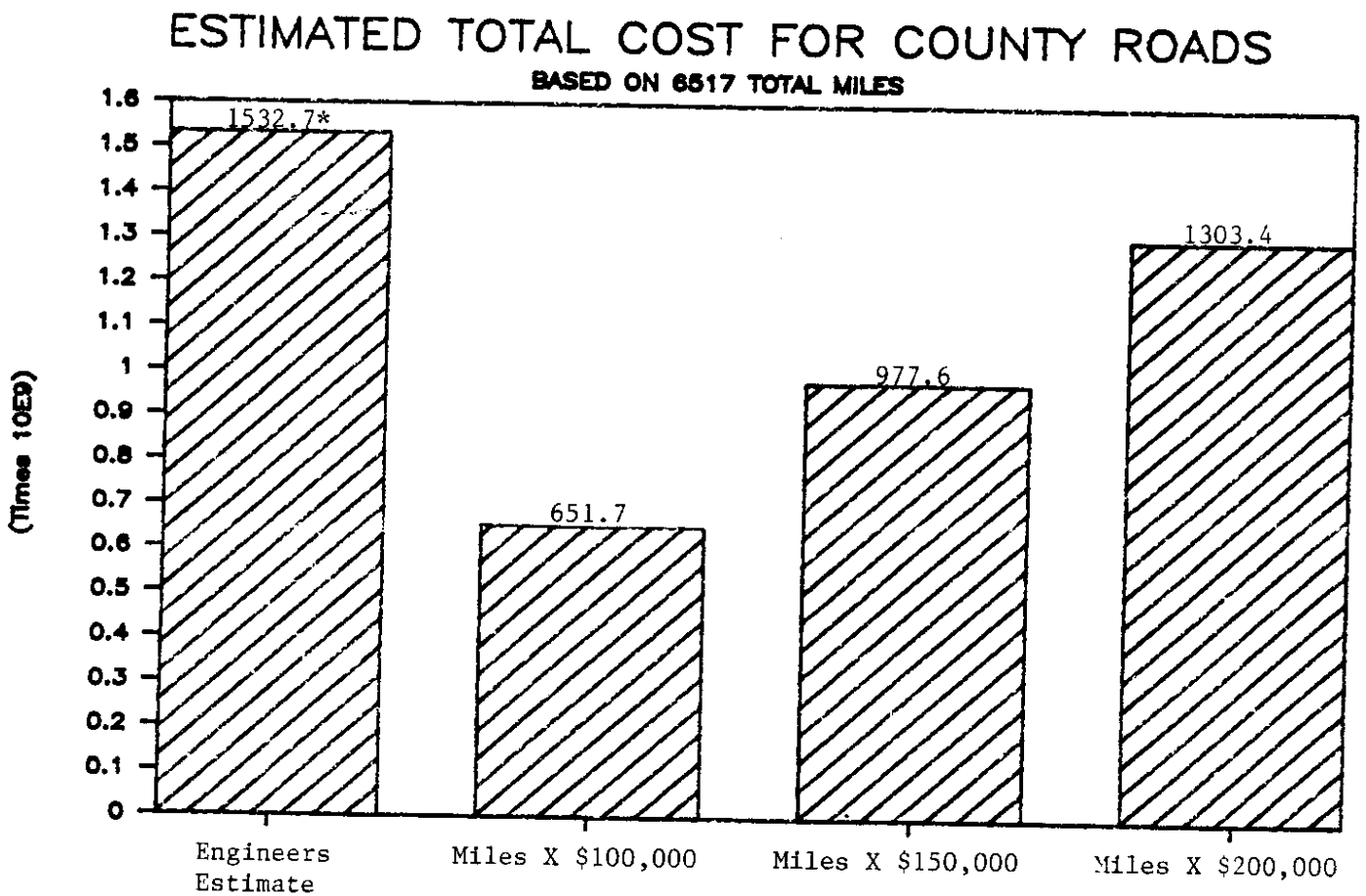
Estimates of Total Miles and Cost for Needed Repairs by County

County	Miles Needing Repair	Total Cost (millions)
Adams	1,543	308.6
Benton	672	104
*Columbia	N/A	N/A
Douglas	600	150
*Franklin	N/A	N/A
Grant	400	210
*Lincoln	N/A	N/A
Spokane	1,110	155.1
Walla Walla	250	120
Whitman	1,942	485
Total	6,517	1,532.7

*Columbia and Franklin County engineers stated they could not make an estimate. Lincoln estimated overall needs of $865 million but did not identify road mileage or cause.

The total cost estimates provided by the engineers were compared to independent estimates generated based on differing rebuilding costs. The total number of miles reported by the engineers (6,517) was multiplied by rebuilding cost estimates of $100,000, $150,000 and $200,000. These estimates were then compared to the engineer's total cost, $1.5 million, to evaluate the accuracy of that estimate (Figure 2). It is important to note that the estimates of the engineers also include costs of rebuilding or repairing bridges which could not be included in the estimates generated for this exercise. Considering this fact, the total cost estimate of the county engineers appears to be reasonable and defendable, given the number of miles of roads in need of repair.

Figure 2



*Engineers estimates include bridge repair.
*Not Lincoln County.

Location and Causes of Impacts to County Roads

A primary objective of this study was to determine which road segments are being impacted by changes in the grain transportation system and to identify the sources of those impacts. To identify these road segments, the county engineers were asked to list problem roads within their counties. This information was combined with the county's Six Year Essential Requirements Program and survey results from a 1984 WSU Department of Agricultural Economics study of grain elevator operators.

The locations of these identified roads were then compared to the known locations of grain elevators, MCLFs, and river terminals. It was assumed that those problem road segments which were found to be close to one or more of these grain handling facilities were in fact being directly impacted by traffic serving them. When available, cost estimates for repairing these roads were also included. Lincoln and Spokane County engineers were able to supply detailed information on the sources of impacts on their road systems. This information is presented in Table 4 and serves as a model of impact sources for the study region.

Table 4

Sources of Impacts on Roads in Lincoln and Spokane Counties

	Lincoln Co.			Spokane Co.		
Source of Impact	miles	cost (millions)	percent	miles	cost (millions)	percent
Rail Line Abandonment	48.7	4.87	27	30	6.0	15
Truck to Barge	0	0	0	40	7.6	19
MCLF	101.0	10.0	56	30	5.7	15
On Farm Storage	30.0	3.0	17	200	8.0	20
Non Grain	0	0	0	300	12.0	31
Total	179.7	17.87	100	600	39.3	100

Source: County Engineer Survey.

A detailed map highlighting those roads in Lincoln County being affected by grain movements is included (see Figure 3). As one of the largest grain producers in the state, Lincoln County is impacted heavily by grain transportation. Figure 3 and Table 4 detail a total of 179.7 miles of impacted roads in all areas of the county. This total included 48.7 miles which was directly attributed to the abandonment in 1983 of 17.5 miles of Burlington Northern rail line from Davenport to Eleanor. Using a cost of $100,000 per mile (which is the county engineer's estimate and is by far the lowest of all of the counties studied) to rebuild these roads, the impact to the county of rail line abandonment above was nearly $5 million. The survey further revealed 101 miles of impacted county roads close to or directly serving multiple car rail facilities. The cost to repair those roads was estimated at $10 million. The source of the impact of the additional 30 miles of impacted roads is not easily categorized, although their locations in largely rural areas implies that shipping to and from on-farm storage may be an important factor. Shipments to river terminals generally leave the county on state routes and therefore do not impact county roads to a large degree.

The Spokane County engineers also prepared a map outline of impacted roads. This map is provided in Figure 4. Spokane County reported a total of 600 miles of affected roads, half of which are marginally affected, usually by automobile traffic (Table 4). This is largely due to a continuing migration from Spokane out to the rural areas surrounding the city. Of the remaining 300 miles, 200 are considered to be impacted largely by on-farm storage with an estimated rebuilding cost of $8 million. The 1983 abandonment by Burlington

Figure 3

Lincoln County Selected Characteristics

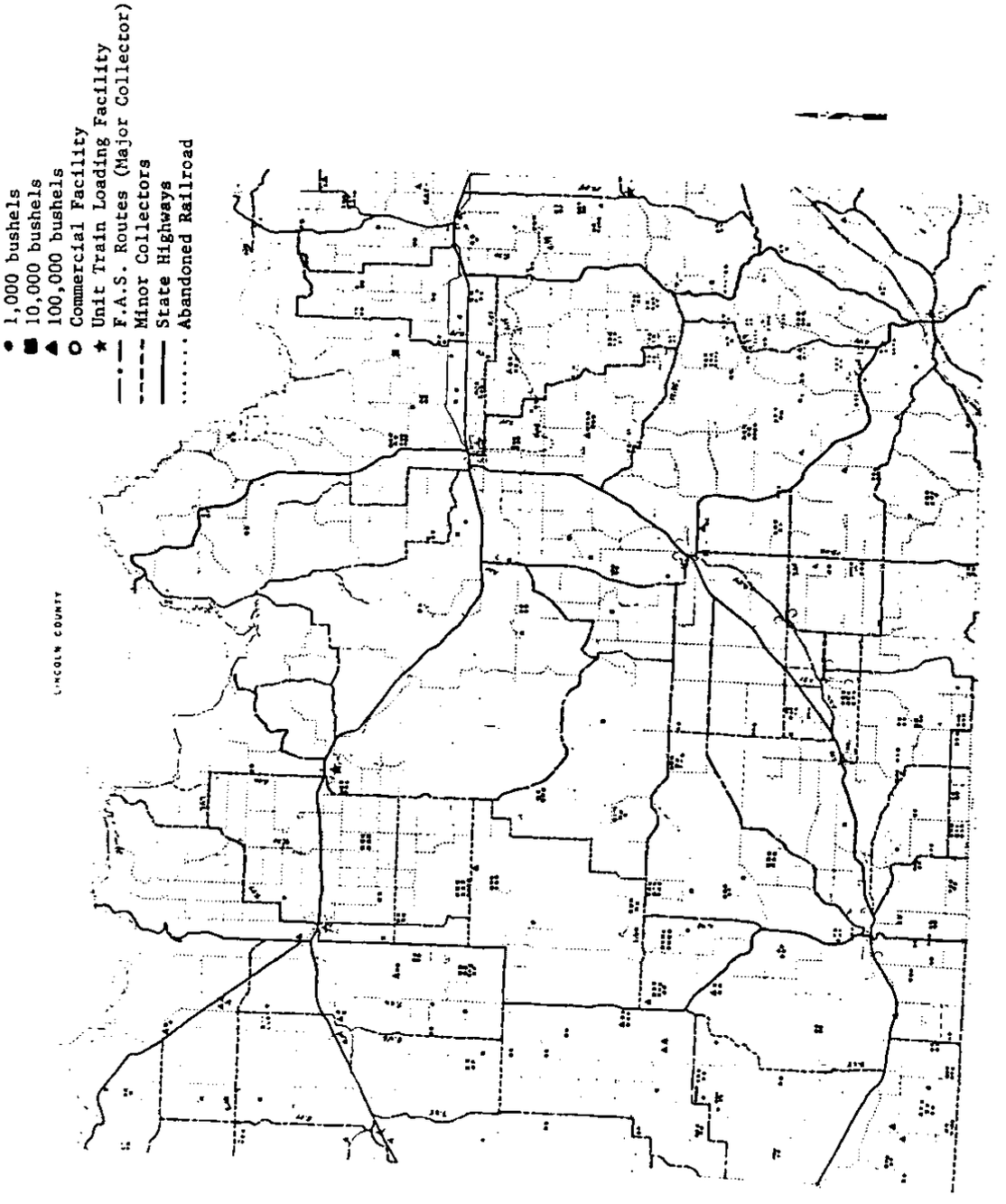
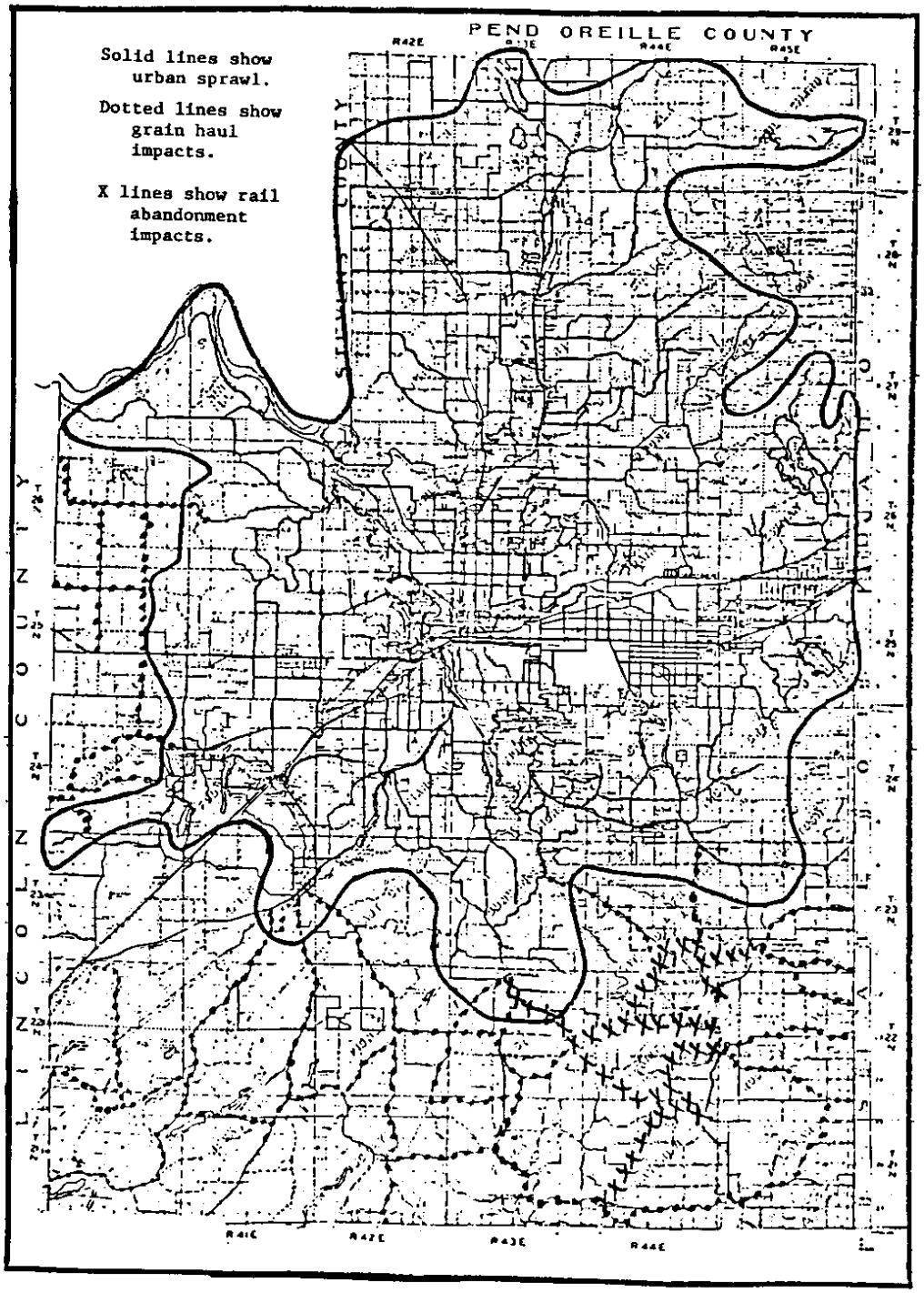


Figure 4. Map of Spokane County.



Northern of 14.3 miles of track between Spring Valley and Mt. Hope has affected 30 miles of county roads with an estimated repair cost of $6 million. The Spokane County engineers also attribute 40 miles of impacted roads to truck barge shipments and 30 miles to hauling into multiple car rail facilities. The estimated costs to repair these roads are $7.6 million and $5.7 million, respectively.

The Whitman County engineer was able to identify the roads impacted by railline abandonment in the county, a total of 216.8 miles (see Table 5). At an average rebuilding cost of $200,000 per mile the total estimated impact was $43.4 million in Whitman County.

Table 5

Whitman County Roads Affected
by Loss of Railroad Lines

Road No.	Length (miles)
District 1	
150	3.65
1100	7.0
1000	6.0
3000/3380	11.25
3360/3000	6.50
4100	7.0
3570	1.0
4010/4020	
4030	2.3
4010	5.0
2000	11.29
2500	6.5
3660/3000	4.0
	71.49

Road No.	Length (miles)
District 2	
9410/9430	3.0
9540	1.5
9050/9120/9030	6.0
5250/5420	5.0
5500	5.0
5020	
2400	4.0
	24.5
District 3	
2450	1.10
2500	5.0
2510	5.0
4000	25.0
4010	13.5
4230	5.16
4400	6.74
6000	11.5
6130	4.19
6140	4.81
7000	13.0
7080	3.25
8000	13.0
8150	7.6
8020	2.0
	120.85

These detailed findings do support the hypothesis that county roads are significantly affected by grain shipping and changes in the grain transportation system. Regrettably, many of the counties studied could not provide detailed information on causes of impacts.

The following table is a list of county roads which, due to their proximity to multiple car loading facilities or river terminals, have been or may in the future be impacted by grain trucking. The list was compiled from the county engineer surveys, combined with a separate telephone survey of all of the multiple car loading facility operators

in the study area. The MCLF operators were asked to list those roads which they use to receive grain either during harvest or as year round transshipment from storage.

Table 6

County Roads Susceptible to Impacts from Grain Trucking to Multiple Car Loading Facilities or River Terminals

County	Area or City	County Roads
Adams	Bruce	Cunningham Rd. 24410
		Booker Rd.
	Lind	Lind - Ralston Rd.
		Neilson Rd.
		Wahl Rd. No., Wahl Rd. So.
		Lind - Kahlotus Rd.
		Lind - Hatton Rd.
		Longmeir Rd.
	Shrag	Shrag Rd.
		Moody Rd.
		Kulm Rd.
		Rosenoff Rd.
	Ritzville	Marcellus Rd.
		Coker - Tokio Rd.
		Wellsandt Rd.
		Paha - Packard Rd.
Benton	Tri-Cities	All County Roads
Columbia	Lyons Ferry	Whetstone Rd.
		Smith Hollow Rd.
		Powers Rd.
Douglas	Supplee	Barnes Rd.
		Uhrich Rd.
		Supplee Rd.
		Brandts Rd.
		Slusser Rd.
	Waterville	Close Rd.
		Waterville No. Rd. 9510
		Waterville So. Rd. 9417
		Goll Rd.
	Alstown	Stotts Rd.
		Westerman Rd.
		Titchenal Canyon Rd.
		Armstrong Rd.
	Brewster	Golden Rd.
	East Wenatchee	All County Roads

County	Area of City	County Roads
Franklin	Windust	Burr Canyon Rd.
		Hunt Rd.
		Pasco - Kahlotus Rd.
		Wallace - Walker Rd.
		Devils Canyon Rd.
	Pasco	All County Roads
Grant	Royal City	Halstens Rd. SW. and SE.
		Road L SW.
		Lower Crab Creek Rd.
		O'Sullivan Rd.
	Ephrata	Sagebrush Flats Rd.
		Johnson Rd.
		Two Springs Rd.
		Sheep Canyon Rd.
	Hartline	Hartline Rd.
		Roads 44 NE. and V NE.
	Coulee City	Airfield Rd.
		Pinto Ridge RD.
	Grand Coulee	Grand Coulee Hill Road
Lincoln	Almira	Almira Rd. North and South
		Hanson Station Rd.
	Harrington	Coffee Pot Rd. 9240
		Rocklyn Rd. 9225
		Duck Lake Rd. 9231
		Tokio Rd. 9325
		Mohler Rd. 3456
	Govan	Govan Rd. 1613
		East Govan Rd. 1901
		Sheffels Rd. 4267
	Odessa	Schoonover Rd. 9210
		Duck Lake Rd. 9231
	Irby	Irby Rd.
	Lamona	Ring Rd. 9220
		Road # 2225
	Davenport	Hawk Creek Rd. 5545
		Gunning Rd. 5471
		Omans Rd. 9619
		Roads #6246 and #6306
	Wilbur	So. Menke Rd. 9445
		Ramsey Rd. 4617
	Reardon	Woukon Rd. 9335
		Pumphouse Rd. 6874
		Denny Station Rd. 6224
		Butte Rd. 6513
		Rife Rd. 6831
	Creston	Creston Rd. 9475
		Bachelor Drive 9510
		Lincoln Rd. 9459
		Mtn. View Rd. 4895

County	Area or City	County Road
	Edwall	Bluestem Rd. 9610
		Merkel Rd. 3916
		Cloverdale Rd. 6362
Spokane	Plaza	Plaza Rd.
		North Pine Creek Rd.
		Cheney - Plaza Rd.
		Powers Rd.
	Fairfield	Bradshaw Rd.
		Truax Rd.
		Morgh Rd.
		Prairie View Rd.
		West Bradshaw Rd.
Walla Walla	Lyons Ferry	Lyons Ferry Rd.
		Ayer Rd.
	Sheffler	Simmons Rd.
		Walker Pit Rd.
		Sheffler Rd.
		Wooden Rd.
		Eureka North Rd.
	Walla Walla	All County Roads
Whitman	Mockonema	McNeilly Rd.
		Endicott East Rd.
		Morley Rd.
	Fallon	Fallon Rd.
		Sand Rd.
		Parvin Rd.
		Old Albion Rd.
	Oakesdale	Thorn Creek Rd.
		Finch Rd.
		Trestle Creek Rd.
		Sheahan Rd.
		Eckhart Rd.
	Almota	Almota Rd.
		Goose Creek Rd.
		Busch Rd.
		Jenkins Rd.
		Story Rd. 8400
		Severs Rd.
	Central Ferry	Central Ferry Rd.
		Little Alkali Rd.
		Big Alkali Rd.
		Church Hill Rd.

Causes of Truck Damage to County Roads

Regardless of the destination, it is trucks carrying grain that damage highways and roads. In recent years, "producers have not increased truck size significantly" nor has there been large increases in the distance farmers are trucking their grain. However, there has been a significant increase in the amount of transshipment between elevators belonging to grain handlers. Much of this transshipment is probably occurring in the winter and spring months when roads are most susceptible to damage (Borris et al., 1986).

The county engineers surveyed agreed with this assessment. During harvest time, farmer owned one and two ton trucks are the primary grain haulers in the counties of Spokane, Whitman, Douglas, and Lincoln. These trucks make short trips to local grain elevators or to farmer owned storage bins. Although many of these trucks are grossly overloaded, the damage they do to county roads is lessened by the generally hard, dry condition of the road beds in late summer. With the exception of Spokane County, where one and two ton trucks are generally used, grain trucking during the remainder of the year is predominantly with semi tractors. The semis transport grain from on farm storage or remote grain elevators to rail facilities and river ports. The heavy loads carried by the semis plus the wet condition of the roads, particularly during the spring thaw, have severely damaged some roads in these counties.

Heavy use of large tandem axle trucks and semis both during harvest and year round was reported in Walla Walla, Grant, Douglas, and Franklin Counties. In addition to grain, these counties produce a variety of fruits and vegetables which are also carried in large trucks. Fruit, as

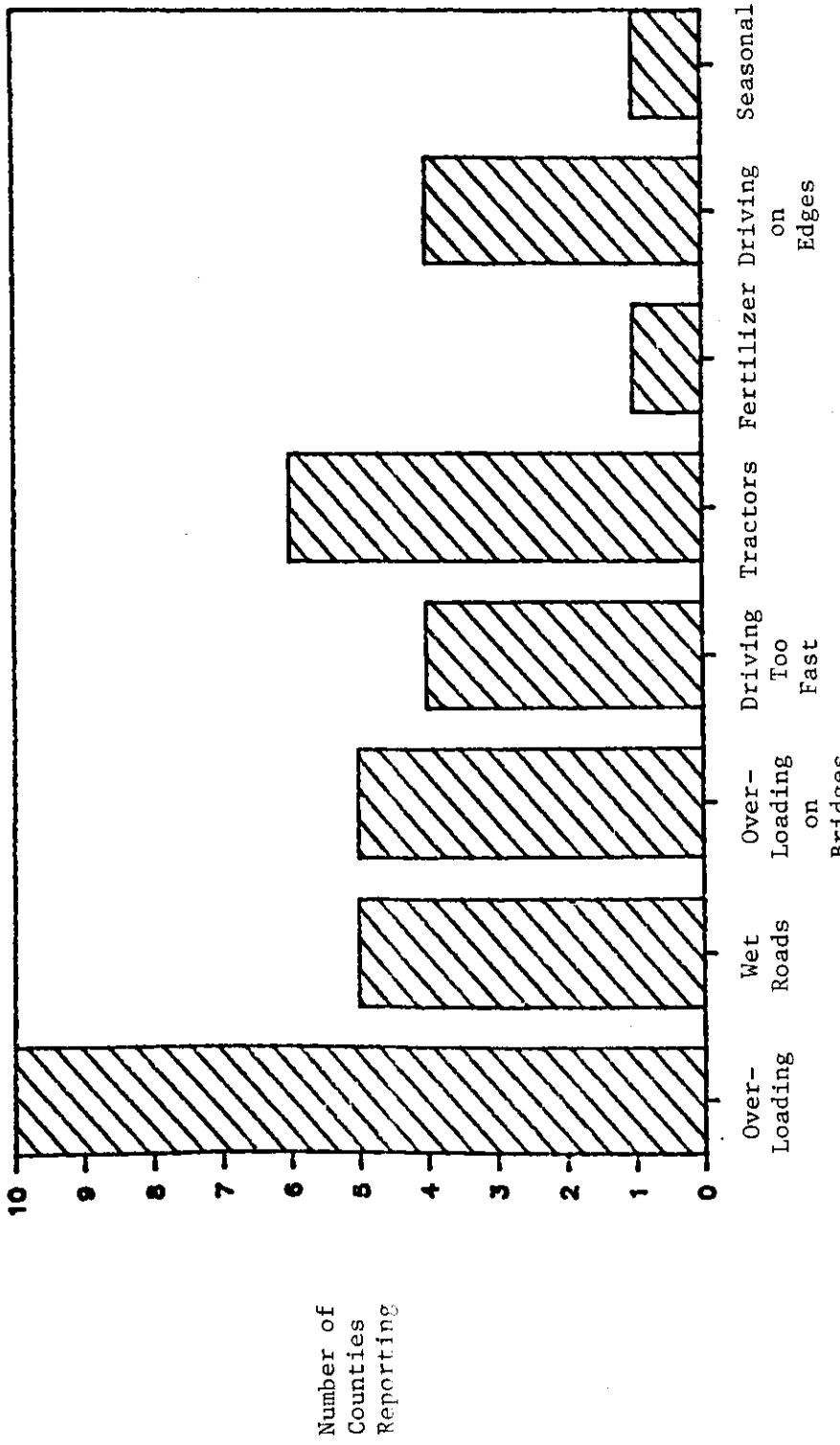
well as grain, is often stored for a short time and then hauled in large trucks during the spring months. Specific damage estimates from truck use was not available from Adams, Benton, and Columbia Counties.

The type of truck being used often affects the magnitude of damage. The engineers were asked to list those trucks and truck uses which they thought were most damaging to county roads and road budgets. Their responses are represented by the graph in Figure 5. Four of the engineers felt tandem axle trucks to be most damaging due to their weight and the pounding action of the axles. Specialized fruit carriers were also singled out as being particularly damaging as were single axle trucks, semis, school buses, concrete and garbage trucks. The general consensus of the engineers was that regardless of the size or type of truck, it is the overloading which occurs regularly that causes most of the damage to county roads. Weak or obsolete bridges also affect the financial needs of the county road system, as indicated in Figure 5.

In addition to overloading, several other practices contribute to poor roads. A primary concern during the spring months is the soft road beds which results from the spring thaw. Weight restrictions during the spring are common throughout the region as the counties attempt to protect roads from heavy trucks. A road may be restricted for a few weeks to a month or more depending on weather and the type of road. When a road is restricted, the engineers try to accommodate truck traffic by routing them to roads less affected by the seasonal condition. Where no detour is available, truck drivers are often able to secure special permits which allow them to travel the road during the early morning hours when the road bed is frozen.

Figure 5

Causes of Damage to County Roads and Bridges



Despite the efforts of the engineers, disregard of weight restrictions was felt to be very common. Apprehending operators who overload trucks or drive on restricted roads is difficult and costly to the counties. (It can also make the engineer and the board of commissioners very unpopular with area farmers.) Because of this, few of the counties actively pursue offenders, relying instead on a spirit of cooperation with grain haulers and other truck drivers to keep violations to a minimum.

Driving farm tractors on county roads was also listed by several counties. Tractors damage roads by either sinking into the soft BST surface on hot days or by simply being too wide and breaking down the road edges. Another problem is that of overloading weak bridges (often between the field and farm). This can dramatically shorten the life of a bridge, as well as being a dangerous practice. Driving too fast for the condition of the road is also unsafe, and is particularly damaging to gravel roads. This practice will quickly spread the gravel and dirt onto the road sides and into drainage ditches, requiring increased maintenance.

Financing County Roads

County road departments receive funding from a variety of sources. Given the obvious need for increased funding determined in this study, it is useful to review the sources of funds presently used by counties. Traditionally, local funding sources have comprised 40 to 50 percent of county road budgets in Washington State. This percentage is slightly lower for the 10 counties surveyed which average 35 to 40 percent. At the local level, the primary source of funding is property taxes. The

total amount collected for county roads is limited by state law to 106 percent of the highest collection for the past three years and also cannot exceed $2.25 per $1,000.00 of assessed property values (Financing Washington's Transportation System, 1983). The approximate proportions of local, state and federal funding of county roads for eight of the counties where data were available are shown in Figure 6. State percentages range from 80 percent for Douglas to 20 percent in Benton County. The difference in use of federal lands is even more pronounced, ranging from no federal funds in Grant County to 50 percent in Benton County. (The range reflects Forest Service programs).

State funding for county roads is primarily from the allocation of the state motor fuel tax. For the counties studied, the motor vehicle tax accounted for 30 to 55 percent of the entire road budget. Other sources of state funding include Urban Arterial Bond (UAB) funds and the Rural Arterial Program (RAP). State funding for county roads averages approximately one-half of the county road budgets for the study group.

Federal funding sources for county roads include the Federal Aid Secondary Systems (FAS), Bridge Replacement Off System (BROS), Federal Aid Urban System (FAUS), and the Federal Forest Reserve Program. These programs along with other federal revenue sharing programs are becoming increasingly important sources of revenues for the counties. The proportion of the county road budgets obtained from federal funds averaged approximately 15 percent.

The federal and state road programs make possible many road construction projects which the counties could not afford on their own. Although this type of help is available, all of the counties reported that construction projects are still very difficult to fund. High costs

Figure 6. Sources of funds.

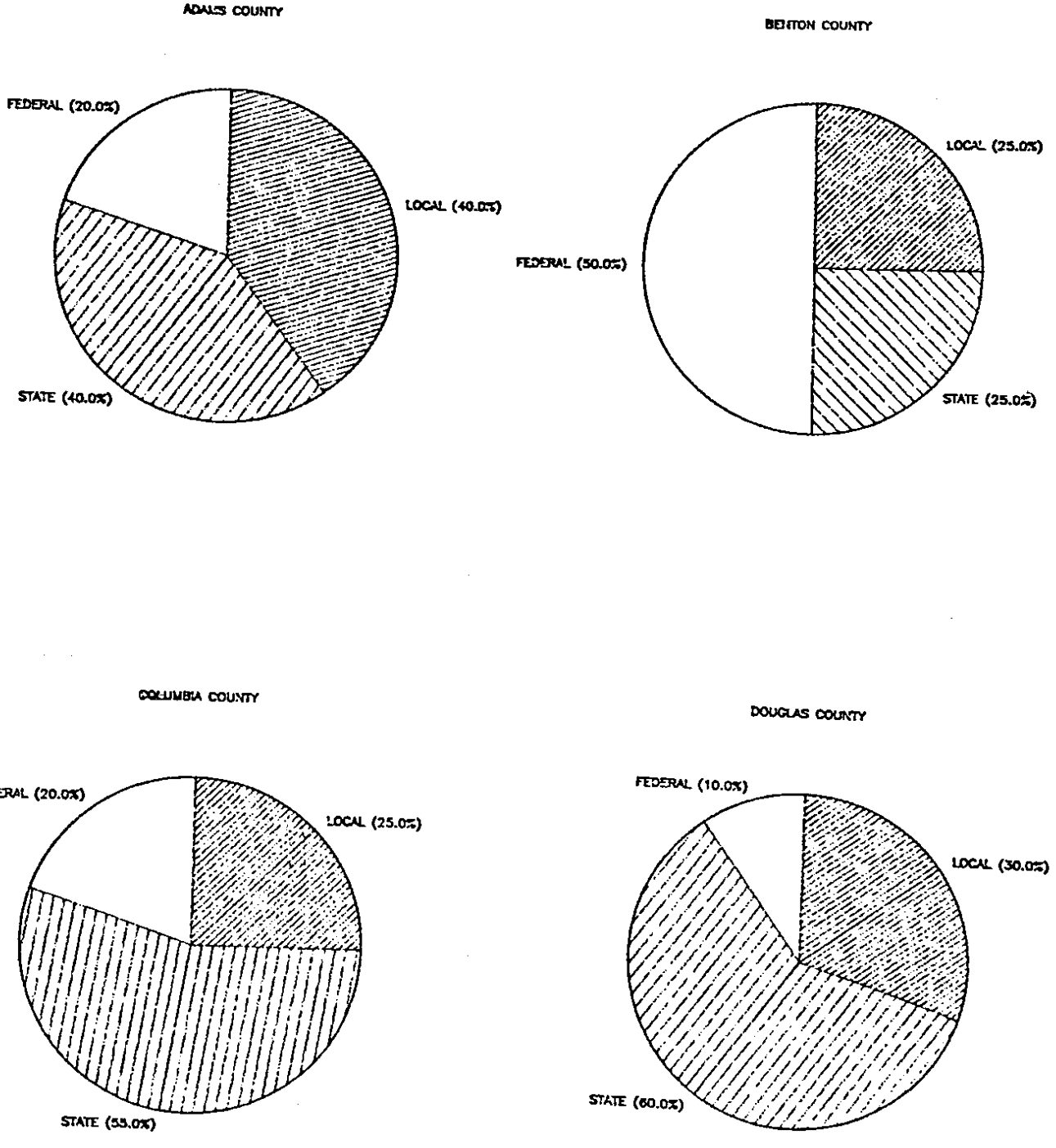
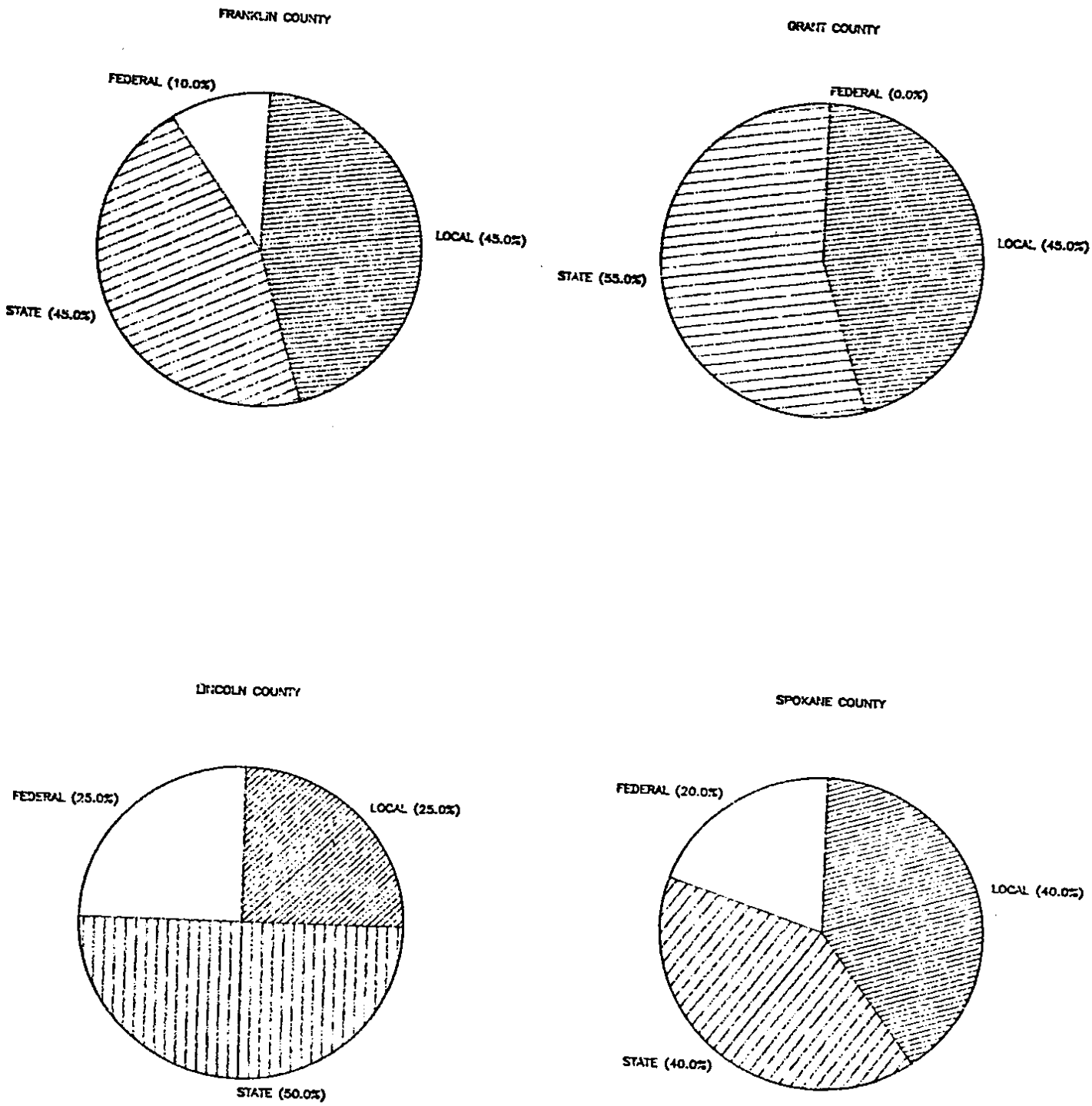


Figure 6. Sources of Funds.



for maintenance and other expenses, combined with county governments sometimes diverting funds from the road departments, have limited the ability of the county road departments to secure the matching funds required to take advantage of these programs.

Internal Road Fund Allocation Process for Counties

The process by which funds are allocated to the road department, and to individual roads, has a strong effect on how well transportation needs are served. This allocation process can range from being political and serving only special interest groups, to being purely objective by considering only road conditions and observable needs. The actual allocation process in eastern Washington was found to be between these two extremes. Each year, the State Department of Transportation requires each county to submit a Six Year Transportation Improvement Program. This program outlines the county's plans for new construction or major reconstruction of roads for the following six years, and includes information on individual road segments, the type of work planned, and the cost and source of funding for each segment. It is the task of the county road engineer or public works director to develop the six year plan, and to present it for approval by the board of county commissioners. The board members then have an opportunity to adopt the plan as presented or alter any part. The amount of involvement by the county commissioners varied across the sample group from very limited to active participation in project selection. In general, the engineers reported that, with few exceptions, politics played only a minor role in the selection of construction projects.

The procedures used by the county engineers for developing the road plan included carefully evaluating and prioritizing problem roads and then allocating funds to meet the needs that exist. The rating systems used by the counties surveyed varied widely in level of sophistication, but, in general, were found to be based on many of the same variables. These include: condition of the existing road, projected maintenance costs, safety factors, amount and type of traffic, and citizen input. Due to budget considerations, availability of outside funding has become a primary determinant of which projects are undertaken. Many counties simply do not list any roads which do not qualify for matching funds through one or more of the various state or federal road programs. The six year plan is normally not followed explicitly, but is used as a guideline for timing and executing large projects. The actual decisions to begin a large project are made yearly by the county engineer in conjunction with the county commissioners.

Decisions on maintenance considerations (seal coating, spot repairs, road grading) are made at the engineer level or lower. Routine decisions are normally made by road supervisors, while the engineer handles abnormally difficult or costly situations.

The above is the general procedure followed by the counties in allocating funds to construction and maintenance projects. Differences in size of budget, size and expertise of staff and personalities of the engineers and/or their boards of commissioners produce variations on these general guidelines.

Implications

This study was a preliminary assessment of the impact on county roads of recent and ongoing changes in grain transportation. Since truck traffic counts were not available, estimates obtained from county engineers in the study area formed the basis for the quantitative findings on road damage. These data are preliminary in nature but do serve a "first look" at these impacts. It is evident that substantial impacts are occurring and that railline abandonment is a major source of these impacts.

Specific comprehensive estimates of the magnitude of these impacts should be available from the forthcoming Road Jurisdiction Committee report. This report is being developed off the WSDOT Pavement Management System and will identify strategies to bring roads to a designated condition within a specific time frame. Further, a current TRAC study on developing a procedure for predicting the impact on roads of railline abandonment prior to such abandonment should provide further information for planners.

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Appendix

COUNTY ENGINEER QUESTIONNAIRE

Name of County_____

Name of Engineer_____

Number of miles of county roads_____

Number of miles Paved_____ Gravel-Dirt_____

Other_____

County roads budget total_____

	Category of funding					
year	_____	_____	_____	_____	_____	_____
1980	_____	_____	_____	_____	_____	_____
1981	_____	_____	_____	_____	_____	_____
1982	_____	_____	_____	_____	_____	_____
1983	_____	_____	_____	_____	_____	_____
1984	_____	_____	_____	_____	_____	_____
1985	_____	_____	_____	_____	_____	_____
1986	_____	_____	_____	_____	_____	_____

COUNTY ROAD POLICIES

A. What is the process by which funds are allocated to different roads? Who Decides? Based on what factors?

B. Have there been any changes in this process in this process over the past few (5) years? Explain.

C. In particular, has there been an increased awareness in the recent past of the impacts and needs of grain traffic in the decision making process?

GENERAL ROAD CONDITIONS

A. What do you consider to be the overall condition of roads in your county?

Excellent Good Fair Poor Very Poor

B. How has the condition of the roads changed over the past 5 years?

Improved Greatly Improved Remained constant Declined

Declined Greatly

C. If improved, what is the nature of the improvement?

_____

_____

_____

_____

D. If deteriorated, What has been the nature of the deterioration? (Increasing rate, decreasing rate, dramatic)

_____

_____

_____

_____

E. How much money do you need over your present budget in order bring all county roads up to par? _____

F. How many miles of roads are in need of repair? _____

G. What percentage of this damage to you attribute to:

	miles	cost
Rail line abandonments	_____	_____
Truck Barge	_____	_____
Multi car loading facilities	_____	_____
Water damage (irrigation)	_____	_____
On farm storage	_____	_____
Non grain movements	_____	_____

H. What are your ten most pressing problem roads, and what is the nature of the problem?

1. Road_____Category of road_____

Problems_____

Cause of problem_____

Age of road_____ Cost to bring to par_____

2 Road_____Category of road_____

Problems_____

Cause of problem_____

Age of road_____ Cost to bring to par_____

3 Road _____Category of road_____

Problems_____

Age of road _____ Cost to bring to par_____