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**Economic Impact of Railroad Abandonment:
Carrington-to-Turtle Lake Rail Line**

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Economic Impact of Railroad Abandonment: Carrington-to-Turtle Lake Rail Line

Abstract

The Carrington-to-Turtle Lake rail line serves five agricultural shippers in a four county area in central North Dakota. Service on the line has been affected by recent embargoes, floods, and poor, deteriorating track conditions. The line is a strong candidate for abandonment as efforts to rehabilitate the line have lacked financial support. Prior to this study, a benefit/cost study, which compares benefits and costs of a rail line reconstruction, was performed for the rail line in an attempt to secure financial assistance for rehabilitation.

Railroad abandonment impacts rural communities and local economies in a variety of ways. Businesses that use rail for transportation usually experience a change in their shipping options. Instead of sending and/or receiving materials and supplies by rail, those items must be moved by truck. The severity of the change is often a function of the amount of material shipped and distance hauled.

Rail abandonment affects property values. In the absence of tax rate changes, reduced property values translate directly into lower property tax revenues for local governments. Rural areas, especially in North Dakota, often do not have adequate road and highway infrastructure to absorb movements of grain and agricultural inputs exclusively by truck. The transference of rail movements to truck traffic accelerates the deterioration of local roads and highways.

Abandonment of the Carrington-to-Turtle Lake rail line was estimated to increase transportation costs for shippers on the line by \$329,000 annually. A majority of the increase in transportation costs would be incurred by farmers in the form of reduced commodity prices. The North Dakota Input-Output Model estimated that the \$329,000 in direct impacts would generate an additional \$682,000 in secondary impacts. Total economic losses for the regional economy were estimated to be \$1 million annually. Additional impacts included an annual loss of \$17,900 in state-collected tax revenue. Annual net costs (i.e., damages less additional user revenues) to repair and maintain state roads impacted from increased truck traffic were estimated at \$297,000 for resurfacing and \$868,000 for reconstruction.

Keywords: rail abandonment, economic impact, rural communities

Economic Impact of Railroad Abandonment: Carrington-to-Turtle Lake Rail Line

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Much of the economy of North Dakota is dependent upon agriculture, especially rural areas in the state (Leistritz et al. 1993; Coon and Leistritz 1994). Crop production, specifically wheat, barley, sunflower, oats, and other grains, is the dominant agricultural activity. Since North Dakota has little in-state grain processing (relative to in-state production), most of agricultural commodities produced are shipped out of state. The dependence on efficient transportation systems is particularly important to rural economies whose economic base is highly reliant on agriculture.

Traditionally, agricultural commodities are moved by rail and truck from North Dakota to destinations throughout the United States. Since 1985, rail transportation has accounted for 75 percent of all grain and oilseed shipments from North Dakota elevators to in-state and out-of-state destinations (Andreson and Vachal 1995). Besides delivering agricultural commodities to various destinations, rail service in rural agriculturally dependent communities also plays a role in bringing in agricultural inputs (e.g., fertilizer, implements). Other non-agricultural commodities and inputs are also moved by rail to North Dakota communities, especially those with manufacturing industries. In an era of pursuing rural economic development, rail access can be a critical factor in a community's ability to attract new manufacturing and/or agricultural processing facilities.

Thus, rural based economies and other agriculturally dependent businesses and communities become particularly concerned about maintaining existing rail services. Changes in availability and access to rural

transportation can be particularly troubling to small rural communities. Not only are rural transportation links important to agriculturally based businesses, but loss of rail service can affect economic development opportunities. This effect can be additionally troublesome since most small rural communities have suffered some economic decline (e.g., loss in population, retail sales, etc.) during the 1980s and early 1990s (Leistritz and Wanzek 1993; Coon et al. 1995), making it harder to retain rural remote rail service. Competition in the transportation industry, along with the deteriorated condition of some rail lines, has forced some railroad companies to re-examine the economic viability of low volume branch lines. Such is the case with the Carrington-to-Turtle Lake rail line.

OBJECTIVES

The purpose of this study is to assess the economic impacts of an abandonment of the Carrington-to-Turtle Lake rail line. The abandonment was assessed by evaluating the rail line in a rehabilitated capacity.

DISCUSSION

The Carrington-to-Turtle Lake rail line was originally constructed by Northern Pacific Railroad in the late 1880s. The rail line was designed to service several small towns and communities located between Carrington and Turtle Lake. The rail line runs for 84.9 miles in central North Dakota (Figure 1). The line generated an average of 561 carloads from 1992 through 1994, although rail volumes before that period were higher.

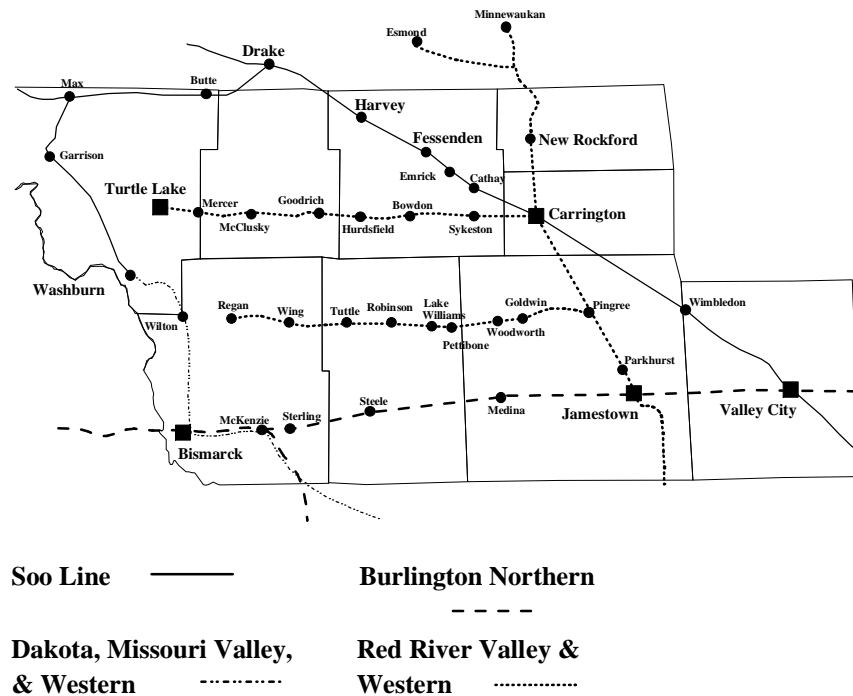


Figure 1. Carrington-to-Turtle Lake Rail Line and Surrounding Region, North Dakota, 1996
 Source: North Dakota Public Service Commission (1994).

In the late 1980s, Burlington Northern Railroad began divesting branch lines to regional and local railroad companies. In 1987, the Red River Valley and Western Railroad (RRV&W), a short line railroad company, began operating the line. The line was substantially deteriorated when control shifted to RRV&W. Subsequently, deterioration has reached the point where attempts to move rail cars on the line generally result in derailment. The line condition, combined with a lack of financial resources for rehabilitation, has resulted in nearly all service on the line being discontinued. As a result of the near abandoned state of the rail line, shippers on the line began moving their grain by truck.

The rail line abandonment will directly affect four counties (McLean, Sheridan, Wells, and Foster) in central North Dakota. Turtle Lake, Mercer, McClusky, Denhoff, Goodrich, Hurdsfield, Bowdon, Heaton, Sykeston, and

Carrington are communities also directly affected.

Population in the affected area in 1995 was estimated at 20,888 people. The combined population of cities on the rail line comprise about 20 percent (3,971 people) of affected area's population. The largest cities affected by the abandonment include Carrington (2,258 people), Turtle Lake (583 people), and McClusky (463 people).

The economic base in the impacted area is primarily composed of agriculture and federal activities. Energy is an important industry in McLean County; however, the branch line in this study does not extend beyond the eastern edge of the county and is not directly involved with the energy industry. Agriculture represents over 50 percent of the economic base in the affected counties. In Foster, Sheridan, and Wells Counties, agriculture accounts for over 70 percent of the economic base. Federal activities

in the four county area account for about 20 percent of the economic base.

Procedures

This study follows the methods developed by Honeyman (1995). Those methods include estimating (1) the change in shipper costs associated with moving grain by truck compared to the costs using rail, (2) the effects of increased truck traffic on local road infrastructure, (3) the secondary economic effects on related sectors in the economy, (4) the local tax revenue consequences of rail line abandonment, and (5) discussing the economic development opportunities that are associated with rail abandonment.

The status of the Carrington-to-Turtle Lake rail line in 1996 was synonymous with abandonment. The condition of the track, ties, and ballast had deteriorated to the extent that attempts to ship grain over the rail line resulted in derailments (Red River Valley and Western 1996). Thus, in assessing abandonment impacts, present transportation costs (using trucks and transshipments) are compared with rail costs that existed when the rail line was operational, and losses in property values and local road infrastructure are estimated.

Input-Output Analysis

Economic activity from a project, program, or policy can be categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or direct effects of the project, program, or policy. Secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within the economy. Input-output (I-O) analysis traces linkages (i.e., the amount of spending and respending) among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985).

This process of spending and respending can be explained by using an example. A single dollar from a North Dakota wheat producer

(*Households* sector) may be spent for a loaf of bread at the local store (*Retail Trade* sector); the store uses part of that dollar to pay for the next shipment of bread (*Transportation* and *Agricultural Processing* sectors) and part to pay the store employee (*Households* sector) who shelved or sold the bread; the bread supplier uses part of that dollar to pay for the grain used to make the bread (*Agriculture-Crops* sector) ... and so on (Hamm et al. 1993).

RESULTS

While the railroad industry has realized efficiency and productivity gains through branch line abandonment, rural communities may have been negatively impacted due to the loss of rail service. Generally, these impacts have included (1) increased transportation costs to shippers, (2) increased highway and local road use and associated costs, (3) reductions in economy-wide personal income and gross business volume, (4) unemployment and job transfer in the local work force, (5) reductions in local tax revenue, and (6) reduced economic development opportunities. These impacts can be divided into *direct* and *secondary* impacts.

Direct Impacts

Railroad abandonment will directly affect the grain elevators in Turtle Lake, McClusky, Goodrich, Hurdsfield, and Bowdon. These shippers were surveyed to determine their most likely options in the event of abandonment. In the absence of rail service, elevators on the line would ship most of the grain (i.e., most of the grain that had historically moved by rail) by truck to the nearest railhead (facility capable of loading grain from trucks onto rail cars) for transshipping¹ or directly to final market by truck. Due to extra loading and unloading costs, transshipping usually raises shipping costs. Also, truck rates generally are not competitive with rail for long hauls, thereby raising costs in

¹Transshipping was defined as the process of moving grain by truck to a facility capable of unloading grain from truck and loading grain onto rail. Grain transshipped moves by rail from the transshipment point to final destination.

the absence of rail access. In addition, the reduction of competitive factors in rural areas, including a lack of intra-modal (e.g., truck vs truck) and inter-modal (e.g., truck vs rail) competition, can influence transportation rates.

Rail abandonment diverts rail traffic onto local highways and roads. In rural areas, these usually consist of light-duty, low-volume roads not designed for heavy traffic (Tolliver 1994). As a result, state and local governments are burdened with greater road maintenance and construction costs. Local governments are further burdened with reductions in local property tax collections.

Transportation Costs

The effect of a rail line abandonment on shippers can be evaluated by looking at the change in transportation costs. Pre-abandonment transportation costs were compared to post-abandonment transportation costs. Pre-abandonment costs were structured using rates, destinations, and volumes associated with a fully rehabilitated line. Conversely, post-abandonment costs were based on no rail service. Change in shipper transportation costs were based on an annual traffic volume of 1,000 cars (pre-abandonment volume of 561 rail cars

and an additional 439 rail cars in the event of rehabilitation).

Post-abandonment shipment options were obtained from a survey of shippers along the line. Shippers acknowledged that most of the grain would be transshipped to nearby elevators on the Soo Line Railroad to the north or to facilities in Carrington to the east (Figure 1). The number of truck loads (determined by converting rail cars into truck loads) were used with commodity flow information to assess the volumes and destinations for the grain previously shipped by rail. Traffic patterns, determined from the survey, were used for determining transshipment distances. Based on mileage from elevators on the line to transshipment points and final destinations, truck costs were estimated (Faucett and Associates 1986; U.S. Department of Agriculture 1995). Post-abandonment railroad shipping costs (i.e., those incurred with transshipping) were based on current railroad tariffs, destinations, and volumes shipped. Total post-abandonment shipping costs were estimated at \$2,467,200, of which, \$1,387,600 was for the pre-abandonment volume of 561 rail cars and \$1,079,600 was for the incremental volume of 439 rail cars (Table 1).

Table 1. Changes in Annual Shipper Transportation Costs, Base and Incremental Traffic, Carrington-to-Turtle Lake Rail Line Abandonment, 1995

Transportation Scenario	Base Case (561 Carloads)	Incremental Traffic (439 Carloads)	Totals
	----- \$ -----		
Pre-Abandonment Shipping Costs ^a	1,193,025	945,519	2,138,544
Post-Abandonment Shipping Costs ^b	1,387,600	1,079,682	2,467,282
Change in Transportation Cost	194,575	134,163	328,738

^a Shipping rates reflected a rehabilitated rail line.

^b Includes truck costs to direct markets and to transshipment points, transloading expenses, and rail costs from transshipment points to final destination.

Railroad shipment costs prior to abandonment were estimated based on rates that would be levied if the rail line was fully operational (Burlington Northern Railroad 1995). Transportation costs for most commodities and destinations were based on multiple car rates. Some low volume commodity-destination combinations used single car rates (e.g., durum shipped to the Pacific Northwest). Pre-abandonment commodity volumes by destination were combined with current tariffs for pre-abandonment traffic (561 rail cars). Weighted averages of pre-abandonment rail shipment characteristics (i.e., approximate volumes by commodity and destination) were used with current rates for the incremental traffic (439 rail cars). Total pre-abandonment shipping costs were estimated at \$2,138,500 (Table 1). About 56 percent of the pre-abandonment transportation expenses were for the original 561 rail cars.

Highway Impacts

Rail abandonment diverts rail traffic onto local highways and roads. In rural areas, the local road infrastructure usually consists of light-duty, low-volume roads not designed for heavy traffic (Tolliver 1994). Increased truck traffic accelerates road and highway deterioration. The increase in deterioration caused by increased truck traffic can be measured as resurfacing or reconstruction costs.

The highway impacts were computed only for the base case (561 rail cars). Information from the shippers' survey was used to develop highway routes (identify the highways used) for shippers along the line. Based on historic grain volumes from each shipper, the number of trucks on various highways was estimated. The attributes of each impacted highway section were obtained from the North Dakota Department of Transportation's (NDDOT) Pavement Management System Database (NDDOT 1993). A modified pavement deterioration model was used to estimate the resurfacing and reconstruction costs per mile (Tolliver 1994). This modified procedure considers that some pavement deterioration

occurs due to environmental decay and normal use.

Resurfacing and reconstruction are two potential highway improvements that may be implemented to repair damaged roads. These costs represent a measure of the incremental damage to local roads and highways occurring annually. The process of resurfacing or reconstruction may only take place over a short period (e.g., one or two construction seasons), but those improvements are expected to last for several years. Thus, road impacts represent a measure of the annual incremental damage, not a measure of annual road repair expenditures.

The loss of rail service results in increased truck activity. Additional truck traffic results in increased user revenues from the trucking industry. User revenues include fuel taxes and vehicle registration fees. The increase in annual user revenues was estimated at \$61,000. The net cost of annual road and highway damage (damages less user revenues) was estimated at \$297,000 for resurfacing improvements and \$868,000 for reconstruction repairs.

Resurfacing improvements are the most appropriate measure of road damages as most highways affected by truck traffic in the study area will probably undergo resurfacing improvements as opposed to reconstruction. This study limited the assessment of road damages to only state highways, although county and township roads also are impacted. Other road and highway impacts are likely to occur as truck routes fluctuate to bypass construction and avoid traffic congestion on main routes or as market forces dictate (i.e., change in destinations and transshipment points).

Effects on Local Employment

This study assumed that sufficient extra capacity exists within the trucking industry to absorb the additional grain flow caused by the Carrington-to-Turtle Lake rail line abandonment without noticeably increasing employment or capital expenditures (Wilson and Dooley 1991). The marginal gains in employment obtained in

the trucking industry would be equally offset by marginal losses in the railroad industry (Red River Valley and Western Railroad 1996). Thus, the branch line abandonment was assumed to result in no change in the level of direct employment in the local or regional economy.

Reductions in Local Tax Revenues

The attractiveness and profitability of businesses on the Carrington-to-Turtle Lake rail line may be reduced by abandonment, which may subsequently translate into reduced property values, particularly for businesses located next to the abandoned line. Reduced property values, in an absence of changes in mill rates or tax base, result in decreased tax revenues for local governments. In addition, railroad property will generate less tax revenue after abandonment.

Increased transportation costs were discounted over time and capitalized into local property values. The result is an estimate of the reduction of property values associated with abandonment. Property value losses were used with property tax calculations to arrive at an estimated loss in property tax collections. The abandonment of the Carrington-to-Turtle Lake rail line was estimated to reduce property values in the study area by \$9.4 million. Based on average mill rates, total property tax losses were estimated at \$155,000 annually.

Reduced Economic Development Opportunities

Diminished economic development opportunities can result from a loss of rail service. The attractiveness of a local community for some businesses and industries can be reduced without rail service. Energy and processing/manufacturing industries which require shipments of large or heavy equipment and bulky material (e.g., coal, grain, chemicals) are unlikely to locate in a community without rail access. Details regarding economic development opportunities in the region that would be lost as a result of rail line abandonment would be required before those impacts could be estimated.

Secondary Impacts

Secondary impacts occur when direct impacts are spent and respent within an economy. In the absence of increased transportation costs, the money spent on the additional transportation cost would be considered revenue for farmers and cooperatives. The increase in transportation costs was viewed as an economic leakage from the local economy. Sufficient capacity exists within the trucking industry to handle the additional traffic volume; therefore, expenses paid by shippers for additional truck transportation were assumed to be made to existing firms and operations (Wilson and Dooley 1991). This study also assumed that most of the trucking firms involved were headquartered outside the affected communities. In the case of the Carrington-to-Turtle Lake rail line, secondary economic impacts result from the loss of business activity that would have been created had the direct impacts (money paid out for extra transportation expense) been spent and respent within the local economy.

Due to the competitive nature of the grain elevator industry (operations are limited by narrow margins), it is unlikely an elevator on the line could absorb much of the increased cost of transportation. In light of the increased cost of transportation, shippers are likely to reduce commodity prices to farmers. The effects of railroad abandonment on the long-term competitiveness and sustainability of shippers on the line were not examined, yet those issues are important factors for communities affected by rail line abandonment.

The overall effect, combination of direct and secondary impacts, is often measured in terms of personal income, gross business volume, and secondary employment. The North Dakota Input-Output Model was used to estimate the secondary effects of rail line abandonment in the four-county area affected by the Carrington-to-Turtle Lake rail line.

Direct impacts (i.e., transportation costs and farmer revenues) were allocated to various sectors of the North Dakota Input-Output Model. Much of the financial burden of increased transportation costs can be shifted from the shipper onto its customers. Shippers pass the costs onto patrons in the form of lower prices. This study assumed that 75 percent of the increase in transportation costs was borne by farmers in the form of lower grain prices. The portion of the increase in transportation costs borne by farmers was allocated to the *Households* sector, while the remaining transportation costs absorbed by shippers was allocated to the *Transportation* sector (Table 2). The loss in local government property tax revenues does not represent less money in circulation within the area economy. This premise assumes that reductions in property values caused by a rail line abandonment will not affect the amount of money (earning capacity) coming into and out of the area economy. A business or individual, affected by

reduced property values, would pay out less in property taxes. Thus, in an absence of a change in the tax base or a change in the tax rate, reduced property taxes would represent a shift from government spending to private-sector spending.

Total direct impacts of \$329,000 generated \$682,000 in secondary impacts. The \$682,000 in secondary impacts represent the amount of economic activity that would have been created if the direct impacts were to have remained in the local economy. The economic sectors with the greatest secondary impacts included *Retail Trade* (\$229,000), *Households* (\$201,000), and *Finance, Insurance, and Real Estate* (\$51,000) (Table 2). A loss in economy-wide personal income was estimated to be \$448,000 annually. The annual decrease in retail sales in the regional economy was estimated to be \$229,000. The economy-wide loss in gross business volume resulting from the rail line abandonment was estimated to be \$1 million annually.

Table 2. Direct, Secondary, and Total Economic Impacts of the Carrington-to-Turtle Lake Rail Line Abandonment, North Dakota, 1996

Economic Sector	Annual Economic Impacts		
	Direct	Secondary	Total
	----- \$ -----		
Agriculture-Livestock		20,000	20,000
Agriculture-Crops		8,000	8,000
Nonmetal Mining		2,000	2,000
Construction		26,000	26,000
Transportation	82,000	3,000	85,000
Communication & Public Utilities		33,000	33,000
Ag Processing & Misc. Mfg.		13,000	13,000
Retail Trade		229,000	229,000
Finance, Insurance, Real Estate		51,000	51,000
Business & Personal Service		19,000	19,000
Professional & Social Service		29,000	29,000
Households	247,000	201,000	448,000
Government		48,000	48,000
Totals	329,000	682,000	1,011,000

Secondary Employment (full-time equivalent jobs) 11

The loss of economic activity in a region can affect secondary employment. Secondary employment estimates represent the number of full-time jobs generated based on the volume of business activity created by an industry. Secondary employment is proxy for the jobs that exist outside of an industry, but employment that is dependent on the existence of that industry. Economy wide secondary employment losses from the rail line abandonment were estimated at 11 full-time equivalent jobs (Table 2).

The impact of the Carrington-to-Turtle Lake rail line abandonment on state-collected tax revenues was estimated. Total foregone tax collections as a result of the branch line abandonment were estimated at \$17,900 annually, which included \$10,600 in sales and use taxes, \$5,800 in individual income taxes, and \$1,500 in corporate income taxes.

SUMMARY

The Carrington-to-Turtle Lake rail line runs for 85 miles in central North Dakota and is operated by the Red River Valley and Western Railroad. Service on the line has been affected by recent embargoes, floods, and poor, deteriorating track condition. As a result of the near abandoned state of the rail line, shippers on the line began moving their grain by truck. The line generated an average of 561 carloads from 1992 through 1994, although rail volumes before that period were higher.

Railroad abandonments impact communities and local economies in a variety of ways. First, shippers on the rail line usually experience a change in their transportation options. Instead of sending and receiving commodities and supplies by rail, shippers now must move those items by truck. The severity of the change is often a function of the amount of material shipped and distance hauled. The process of moving grain and bulk agricultural inputs by truck increases handling requirements, and depending upon quantity and distance moved, can increase per unit hauling rates. The combination of greater handling costs and greater per unit hauling rates results in additional

transportation expenses. The nature of the grain handling industry in North Dakota does not allow shippers much freedom (margins are slim) in absorbing additional transportation costs when competing with other shippers on rail lines. As a result of the competitive situation in the rural grain handling industry, much of the increased costs of transportation are passed onto farmers in the form of lower commodity prices.

Rail abandonment can reduce property values. In the absence of tax rate changes, reduced property values translate directly into lower tax revenues for local governments.

Rural areas in North Dakota often do not have the road and highway infrastructure to handle movement of grain and agricultural inputs exclusively by truck. Additional truck traffic accelerates the deterioration of local roads and highways. The costs of the increased road damage caused by truck traffic is another impact of rail abandonment. Resurfacing and reconstruction were considered the two most likely actions needed to counteract the effects of increased truck traffic. Resurfacing improvements are more likely to occur than reconstruction. Additional impacts that remained unquantified in this study include estimates of lost economic development opportunities, effects of abandonment on the sustainability and competitiveness of shippers on the line, the economic impacts of the loss of railroad profits from line operation, and the traffic and use implications for county and township roads.

Total direct impacts were estimated to be \$329,000 annually. Seventy-five percent of the direct impact was transferred to farmers in the form of lower prices. The secondary impacts were estimated to be \$682,000 annually. The loss of gross business volume from the rail abandonment was estimated at \$1 million annually. The level of gross business volume was enough economic activity to support 11 full-time jobs in the economy. Local property tax collections were estimated to be reduced by \$155,000 annually. The loss of state collected tax revenues included \$10,600 in sales and use taxes, \$5,800 in personal income taxes, and

\$1,500 in corporate income taxes. Avoidable highway investment costs for impacted state roads and highways were estimated at \$297,000 for resurfacing and \$868,000 for reconstruction.

Principally, the change in transportation cost will be felt in the local economy so long as the

rail transportation in the area maintains a competitive advantage over truck transportation. Based on previous conditions in the transportation industry, those advantages appear unlikely to change. Road impacts will continue as long as commodities are forced to move by truck over low-volume, light-duty local roads.

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