2-15-1992

South Dakota's Rural Roads

Charles E. Lamberton
South Dakota State University

SOUTH DAKOTA'S RURAL ROADS

by

Charles E. Lamberton*

Economics Research Report 91-10

February 1992

*Professor in the Economics Department at South Dakota State University.

South Dakota's Rural Roads

The rural transportation system consists of a combination of modern, heavy farm machinery, trucks, and personal vehicles driven over earth, gravel and bituminous roads. These roads were often originally designed for use by horse and wagon. The evolution of transportation and agricultural technologies has changed the demands upon the road system and caused this mismatch between original road design and modern vehicles and equipment. Increased farm production and decreased farm numbers are reflected in fewer rural residents who make more trips and carry heavier loads.

While the decline in the number of rural residents implies that fewer miles of rural roads might be needed, it remains true that the same amount of land is being used for agricultural production and the productivity of the land has increased. Therefore, it remains necessary that the rural road system continues to be extensive enough to provide access to all agricultural areas.

Transportation remains a vital link for agriculture and changes in the local farm to market road network can significantly affect farm costs. The income of South Dakota farmers is generally a residual after all costs, including transportation costs, have been deducted from prices received. These prices are determined in national and international markets and do not respond to regional differences in costs of agricultural transportation. Therefore, South Dakota farm income is directly affected by transportation and the costs and benefits

of the local rural road network. To remain competitive in agricultural markets, South Dakota agriculture must be as efficient as possible. This requires that the rural transportation system be efficient.

The characteristics and financing of this network are described in this paper as an introduction to studies of the required extent of the network in the late 20th century. A subsequent report describes studies of some local rural road systems, methods of evaluating the efficient extent of those systems, and outlines of their net costs.

General Condition of South Dakota Rural Roads and Bridges

This brief summary of the conditions of the state's rural roads and bridges was prepared from the Local Road and Bridge Conputer Data File for 1987. This file is the rural road and bridge inventory of the South Dakota Department of Transportation.

South Dakota has 75,305 miles of rural roads and 6,847 bridges totalling 586,914 feet. The South Dakota Local Road and Bridge Table below shows road and bridge conditions across the state. The inventory includes only those bridges over 20 feet in length. Consequently, the data do not include many of the local bridges which are oldest and in greatest need of repair or replacement.

The majority of local roads in have average daily traffic levels of less than 25 vehicles per day. Gravel surfaced roads are the most common type of rural road with earth and bituminous

surfaces the second and third most common road types. Most local roads in the state are relatively straight and level with few significant deflection angles or grades per critical mile. Those roads with curves, however, are more likely to have extreme rather than moderate curvature. Subgrade stability and drainage adequacy are most commonly rated as good, while surface and base condition, consistency, and rideability are usually rated as fair.

Although most roads are rated approximately equally to be in good or fair conditon, measures of surface and base conditions, subgrade stability, drainage adequacy, and consistency, show that the share of road miles evaluated to be in poor condition is significant. The share ranges from 14 to 20 percent. Generally, less than 1 percent of the road miles are rated in excellent condition. Therefore, improving the roads rated poor and maintaining those rated fair to prevent them from becoming poor will require significant investment in approximately 55 percent of the rural road miles.

Most rural bridges have average daily traffic levels of more than 199 vehicles. Bridge deck condition ratings and safe load ratings are generally good. More than 4,300 of the bridges have standard or tolerable safe load ratings. More than 2,200 bridges area rated intolerable or closed, however, and again provide an indication of the investment which might be required if all bridges were to be retained. Counties are responsible for maintaining 4,751 of the bridges, and 3,139 of the bridges have

an estimated remaining life of more than 20 years. More than 25 percent of the bridges have an estimated remaining life of fewer than 10 years. This suggests that decisions to replace or eliminate these bridges will be required before the end of the 1990's.

South Dakota Local Road and Bridge Conditions

Road Condition Summary

Avg. Daily Traffic	Lt 25	25-49	50-99	100-199	Gt 199
Miles of road	41081.40	15867.79	8352.59	5397.45	4606.41
Percentage	56.0	21.6	11.4	7.4	6.3

Surface Type	Earth	Gravel	Bitum.	Concrete
Miles	17206.54	47427.18	10466.65	204.53
Percentage	23.5	64.7	14.3	.3

Curvature	Lt 20	20-39	40-99	Gt 100
Miles	52198.74	1523.57	5769.25	12436.90

Gradient	0 Grades	1-2	3-4	Gt 5
Miles	14727.76	46443.52	9052.38	1704.80

	Excellent	Good	Fair	Poor
Surf & Base	341.05	28239.32	28877.59	14470.50
Subgrade Stab.	645.98	30944.02	26988.46	13350.00
Drainage Adeq.	724.85	29350.34	28048.99	13804.28
Consistency	3115.41	25537.81	32759.60	10515.64
Rideability	278.70	26627.95	31879.79	16519.20

Total Miles of Rd. 75,305.64
Total Length of Br. 586,916 feet
Number of Bridges 6847

Bridge Condition Summary

Average Daily Traffic	Lt 25	25-49	50-99	100-199	Gt 199
Number of Bridges	654	1523	1813	570	2287
Percentage*	5.1	13.2	18.7	8.4	54.7

Deck Condition Rtg.	New	Good	Fair	Poor	Closed
Number	344	3508	1808	121	237

Safe Load Rating	Superior	Standard	Tol.	Intol.	Closed
Number	208	2212	2130	2001	260

Responsibility	SD DOT	State	County	City	Other
Number	1830	30	4751	143	36

Est. Rem. Life	0-5 years	5-10	10-20	Gt. 20
Number	883	967	1858	3139

* All bridge percentage figures are percent of bridge length in feet, not percent of the number of bridges.

Source: 1987 South Dakota Department of Transportation Local Road and Bridge Computer Data.

Some Regional Contrasts

While road and bridge conditions are relatively uniform statewide, some regional variations occur and are described briefly below. Regions are defined consistently with U.S. Department of Agriculture Crop Reporting Districts. Five districts are east of the Missouri River and four are west of the River. The Regions include the following counties:

Northwest: Butte, Corson, Dewey, Harding, Perkins, Ziebach

West Central: Haakon, Jackson, Lawrence, Meade, Pennington, Stanley

Southwest: Bennett, Custer, Fall River, Shannon

North Central: Brown, Campbell, Edmunds, Faulk, McPherson, Potter, Spink, Walworth

Central: Aurora, Beadle, Brule, Buffalo, Hand, Hughes, Hyde, Jerauld, Sully

South Central: Gregory, Jones, Lyman, Mellette, Todd, Tripp

Northeast: Clark, Codington, Day, Deuel, Grant, Hamlin, Marshall, Roberts

East Central: Brookings, Davison, Hanson, Kingsbury, Lake, McCook, Miner, Minnehaha, Moody, Sanborn

Southeast: Bon Homme, Charles Mix, Clay, Douglas, Hutchinson, Lincoln, Turner, Union, Yankton

The Northeast and East Central Regions have slightly higher average daily traffic (ADT) levels although most roads in these regions still carry fewer than 50 vehicles per day. The

Northwest and Southwest Regions have the most roads with the greatest number and degree of curvature and grades. This reflects not only the obvious effects of the Black Hills but also the nature of the terrain in the other parts of these regions.

While gravel is the most common road surface type in all regions of the state, in the Northeast, East Central and Southeast Regions, bituminous roads are the second most common road surface. In all other regions, earth roads are the second most common. In Jones County, earth is the most common surface type.

Average daily traffic levels in the counties of the Southeast Region are dispersed relatively evenly across the different ranges. This reflects the dispersion of rural population densities found across the region reaching from the more populous eastern counties to those along the Missouri River.

Bridges are most numerous at opposite corners of the state. In the Northwest Region, Butte County has more than 199 bridges with total bridge length greater than 15,000 feet. In the Southeast, all counties have at least 100 bridges stretching over 7,000 feet. The number and length of bridges in this region reflect the many streams and rivers which make of the drainage system. Minnehaha County has more that 422 bridges with aggregate length exceeding 55,000 feet.

The Financing of Local Roads and Bridges

South Dakota's local governments spent over $63 million to finance rural roads and bridges in 1987. Motor vehicle fees and

property taxes provided the funding for $51 million of these expenditures.

Local roads and bridges in South Dakota are maintained and administered by county and township governments. Funds for local infrastructure are classified as collected from two different sources, user taxation and nonuser taxation. The major user tax for funding local roads and bridges is the motor vehicle license tax. The major nonuser tax for funding local roads and bridges is the property tax. The table below, South Dakota County and Township Finances, shows the amounts of nonuser revenue and user revenue committed to the local road and bridge system in fiscal year 1987.

South Dakota County and Township Highway Finances, 1987

	Counties	Townships
Nonuser Revenue		
Property Taxes	$24,193,492	6,246,607
User Revenue		
Motor Vehicle Fees	$16,615,933	$4,668,816
Other	9,108,544	2,286,033
Total	$49,917,969	$13,201,456

Source: 1987 South Dakota Department of Transportation.

User Taxes for Rural Roads and Bridges

User taxes are defined as taxes levied on the basis of road use. The users of highways are taxed directly, and the funds are used to finance local roads and bridges. In South Dakota, revenues placed into the Local Government Highway and Bridge Fund from the State's Motor Vehicle License Fund, License Plate Fund, and Motor Vehicle Fund. These represent user taxes and are allocation in varying proportions according to South Dakota law to finance local road systems.

Road user taxes collected by the South Dakota Department of Revenue accounted for 23 percent of the total Department of Revenue receipts for fiscal year 1987.

Local Government Highway and Bridge Fund

The Local Government Highway and Bridge Fund was created and appropriated for the use of counties, municipalities and townships for the purpose of constructing and maintaining highways, streets and bridges on their highway and street systems. It is the largest fund of user tax revenues designed for the financing of local road systems in South Dakota. In 1987, state government shared over $34 million with local governments through this fund. Each county in South Dakota receives a percentage apportionment from the fund. The apportionment is based on the county's population and miles of local roads. Then each county government allocates the money received from the Local Government Highway and Bridge Fund to the County Highway Department and township governments in proportions determined by South Dakota Law.

Motor Vehicle License Fund

The Local Government Highway and Bridge Fund receives 54 percent of all funds collected from county motor vehicle licenses. Two percent of the funds from the Motor Vehicle License Fund are credited to the State Motor Vehicle Fund and two and one-half percent are distributed to the State License Plate Special Revenue Fund. Funds from motor vehicle fees made up nine percent or $41.4 million, of which $20.9 million was retained by local governments in 1987.

Other

The Other category in the table represents various user funds that are transferred into the Local Government Highway and Bridge Fund. The Other funds include funds from the State's Motor Vehicle Fund and the License Plate Fund. More than $11 million in local road and bridge financing in South Dakota comes from other sources.

Non-User Taxes for Rural Roads and Bridges.

Property Tax

The primary nonuser tax for the maintenance and construction of the local infrastructure is the property tax. The amount of property taxes payable in 1987 to all of the counties in South Dakota was more than $76.5 million. Of that amount, county governments received 22.03 percent, and townships received 1.95 percent. Over $30 million was raised through property taxes to finance rural roads and bridges in South Dakota.

This is a list of the major funding sources for local roads and bridges. Other sources would include special funding sources and relevant amendments to South Dakota Law.

Local Revenue Support

The property tax is the major source of revenue used by local governments to finance road and bridge maintenance and construction. Generally, the burden of financing local roads will vary proportionately with the number of miles of roads in a county. A county's capability of raising revenue from the property tax should be approximately proportional to the value of property in the county. Therefore, the ratio of property market value per mile of road is an indicator of a county's ability to finance its rural road system throught the property tax.

Another indicator of the degree of local ability to support the road system is the density of traffic using the system and therefore subject to direct user charges. Since traffic density data are not sufficiently disaggregated for this purpose, county population can represent a reasonable proxy for the density of road use. Rural population might also provide an indication of the quality of rural roads demanded by local users. The table below, Indicators of Road Support Ability, shows the relationship between total miles of rural road, rural population per mile, and estimated rural property market value per mile for the counties and regions in South Dakota.

The data suggest that the ability to raise revenue throught the property tax does not always vary proportionately with

estimated rural property market value. Consequently, the ability to pay for rural roads exceeds the need in some counties and falls short of what is needed in other counties. For example, Bennett County has 765 miles of rural roads, a rural population per mile of 4, and estimated rural property market value per mile of $81. Lawrence County has 524 miles of rural roads, a rural population per mile of 17, and estimated rural property market value per mile of $328. Lawrence County has a greater basis from which to fund road maintenance than Bennett County, while Lawrence County has fewer miles of roads. As the table indicates, this situation exists between other counties as well.

At the extremes, Minnehaha County displays the greatest potential for raising revenue for road and bridge expenditures through property taxes. The county's estimated rural property market value per mile for 1987 was $338. Shannon County, an unorganized county, has the least potential for revenue from property taxes, with an estimated rural property market value per mile of $11.

Considering both the population and property value indicators, the West Central, Southeast, and East Central Regions appear to have the greatest potential for supporting their road systems. The Northwest, Southwest, Central, and South Central Regions appear to have significantly lower abilities.

Indicators of Road Support Ability

County	Code	Miles of Rural Road	Rural Population Per Mile	Est. Rural Property Market Value Per Mile
Aurora	02	1,146	3.16	$ 71.6
Beadle	03	1,922	3.22	96.7
Bennett	04	765	3.98	80.6
Bon Homme	05	943	8.55	131.4
Brookings	06	1,330	7.05	123.1
Brown	07	2,782	3.96	109.1
Brule	08	1,085	4.83	69.2
Buffalo	09	314	5.72	42.0
Butte	10	791	4.65	123.2
Campbell	11	850	2.64	101.5
Charles Mix	12	1,676	5.78	97.2
Clark	13	1,419	3.45	90.8
Clay	14	739	4.31	184.2
Codington	15	1,154	4.54	75.2
Corson	16	1,715	3.03	58.9
Custer	17	652	9.20	138.7
Davison	18	780	5.00	114.8
Day	19	1,622	5.01	85.4
Deuel	20	948	5.58	115.6
Dewey	21	1,109	4.84	56.1
Douglas	22	791	5.29	80.2
Edmunds	23	1,315	3.92	126.4
Fall River	24	682	5.42	118.4
Faulk	25	1,077	3.09	57.5
Grant	26	1,149	4.23	135.2
Gregory	27	1.091	5.51	78.4
Haakon	28	899	3.11	103.8
Hamlin	29	847	6.21	134.5
Hand	30	1,608	3.08	84.9
Hanson	31	731	4.67	96.1
Harding	32	879	1.93	120.7
Hughes	33	702	3.20	126.7
Hutchinson	34	1,431	6.53	137.8
Hyde	35	663	3.12	82.2
Jackson	36	785	4.38	75.4
Jerauld	37	762	3.84	60.6
Jones	38	622	2.35	147.2
Kingsbury	39	1,396	4.78	95.3
Lake	40	1,027	4.39	218.1
Lawrence	41	524	16.70	327.5
Lincoln	42	1,021	10.67	291.2
Lyman	43	1,181	3.27	121.9
McCook	44	1,021	6.31	95.5

Indicators of Road Support Ability

County	Code	Miles of Rural Road	Rural Population Per Mile	Est. Rural Property Market Value Per Mile
McPherson	45	1,075	3.75	113.2
Marshall	46	1,128	4.79	122.1
Meade	47	1,499	7.18	181.4
Mellette	48	657	3.42	66.1
Miner	49	1,007	3.71	84.8
Minnehaha	50	1,371	15.45	337.8
Moody	51	919	7.28	135.3
Pennington	52	1,516	10.75	261.6
Perkins	53	1,431	3.28	83.1
Potter	54	923	3.98	112.2
Roberts	55	1,662	4.89	102.9
Sanborn	56	932	3.45	67.5
Shannon u.	57	870	9.50	11.3
Spink	58	2,488	2.48	83.0
Stanley	59	575	4.41	125.5
Sully	60	969	2.05	146.4
Todd u.	61	876	8.37	44.1
Tripp	62	1,726	2.20	84.8
Turner	63	1,126	8.22	170.6
Union	64	773	11.57	226.8
Walworth	65	769	3.69	138.1
Yankton	68	826	8.40	198.6
Ziebach	69	864	2.67	79.3
Regions:				
Northwest		5,682	3.4	86.9
Southwest		2,968	4.7	87.3
West Central		5,845	7.0	181.1
Central		7,245	3.6	86.7
Northeast		9,928	4.8	107.7
Southeast		9,324	7.8	168.7
East Central		10,510	6.3	136.8
North Central		11,280	3.4	106.2
South Central		6,792	4.2	90.4

Source: South Dakota Department of Revenue Property Tax Statistical Report, Fiscal Year 1987.

This review of South Dakota rural road system and its financing is merely descriptive. It does not provide a basis for policy recommendations or decisions nor does it address the issues of the value, or demand, for these road systems. Following studies report on case study analyses which provide some approaches and estimates of demand.

REFERENCES

South Dakota Department of Transportation, South Dakota Bridge Inventory Coding Manual and Non-State Trunk Inventory Coding Instructions, SD DOT, Pierre, South Dakota, 1988, pp. 1-129.

South Dakota Department of Transportation, Data on state financing of county and township infrastructure, SD DOT Office of Finance, Pierre, South Dakota, 1988.

South Dakota Department of Revenue, Annual Report.