

The County Road System Looking Towards the Future

Presented for SDACC

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**South Dakota Local Transportation
Assistance Program**

Current 2014 Conditions

- **Overall Condition of Paved Roads** **4.86 of 10**
- **Percent in Failing Condition** **20%**
- **Percent in Poor Condition** **19%**
- **Percent in Fair Condition** **32%**
- **Percent in Good Condition** **21%**
- **Percent in Excellent Condition** **9%**

Current 2014 Conditions

- **Overall Condition of Gravel Roads 6.2 of 10**
- **Percent in Failing Condition 9%**
- **Percent in Poor Condition 17%**
- **Percent in Fair Condition 30%**
- **Percent in Good Condition 36%**
- **Percent in Excellent Condition 10%**

County Bridges

- **Number of County Structures** **4145**
- **Number of Posted or Deficient** **1045**
- **Number of Closed Bridges** **73**

County Highway Needs

- **Out of 57 responses:**

- **Funding** **57**
- **Bridges** **20**
- **Hard Surface Repairs** **17**
- **Gravel Repairs** **16**
- **Equipment and Employees** **10**

Overview of a typical county road system

- **Total Miles on Road System: 352**
 - Miles with Gravel Surface: 197
 - Miles with Asphalt Surface: 155
 - Total Budget of \$2.4 million (\$6,857 per mile)

(Source: SD Dept of Transportation Certified Mileage Report)

Major Concerns:

- The road system is deteriorating faster than the budget can cover rehabilitation.
- Most asphalt surfaces are at end of their life cycle.
- Asphalt surfaces do not have enough base strength under them to support modern loads.
- Gravel surfaces are cheaper and easier to maintain, but people object to dust and loose material on the surface.
- Costs have risen far more rapidly since 2007 than the budget.

Cost of Doing Business:

Gravel Construction: 3/4 inch minus specification hauled and placed on the road @ \$11.00 per ton.

Three examples:

- 1) Two inches placed on one mile at 20 ft width (typical width for a twp road): 1141 tons x \$11.00 = **\$12,540**
- 2) Two inches placed on one mile at 24 ft width (typical width for a county road): 1369 tons x \$11.00 = **\$15,059**
- 3) Five inches placed on one mile at 26 ft width (new construction for a county primary road): 3700 tons x \$11.00 = **\$40,700**

Cost of Doing Business (Con't):

Hot-mixed asphalt (HMA) Construction: Class D or E aggregate spec and 58-28 binder @ \$75 per ton in place

Three Examples:

1) Two inches of HMA placed on one mile at 24 ft width:
1620 tons x \$75.00 = **\$121,500**

2) Two inches of HMA placed on one mile at 26 ft width:
1755 tons x \$75.00 = **\$131,625**

3) Three inches of HMA placed on one mile at 26 ft width:
2630 tons x \$75.00 = **\$197,250**

Cost of Doing Business (Con't):

- **Blotter Surface Construction:** Recycle old surface, add five inches of base gravel and construct blotter surface (prime & seal) – more detail on hand-out. Estimate cost is \$4.97 per sq yd of surface.
- Two Examples:
 - 1) Construction of base and blotter surface on a 24 ft roadway is **\$69,997 per mile**
 - 2) Construction of base and blotter surface on a 26 ft roadway is **\$75, 807 per mile**

Guidance on Gravel Layer Thickness for New Blotter Construction:

Table 4.2. Suggested gravel layer thicknesses for new or reconstructed rural roads.

| Estimated daily no. of heavy trucks | Subgrade support condition ¹ | Suggested minimum gravel layer thickness, mm (in) |
|-------------------------------------|---|---|
| 0 to 5 | Low | 165 (6.5) |
| | Medium | 140 (5.5) |
| | High | 115 (4.5) |
| 5 to 10 | Low | 215 (8.5) |
| | Medium | 180 (7.0) |
| | High | 140 (5.5) |
| 10 to 25 | Low | 290 (11.5) |
| | Medium | 230 (9.0) |
| | High | 180 (7.0) |
| 25 to 50 | Low | 370 (14.5) |
| | Medium | 290 (11.5) |
| | High | 215 (8.5) |

Notes. ¹ Low subgrade support: average CBR \leq 3 percent; medium subgrade support: 3 percent < average CBR \leq 10 percent; high subgrade support: average CBR > 10 percent. ² CBR = California Bearing Ratio of the in-place subgrade soils. Methods of estimating CBR are discussed in section 7 of this document.

Source: *Rural Road Design, Maintenance, and Rehabilitation Guide* published by SD Dept of Transportation

Guidance on Base/Pavement Thickness:

Table 5.1. Suggested AC-Surfaced Pavement Thicknesses.

| Road classification and estimated daily truck traffic | Subgrade support conditions ¹ | AASHTO structural number | Aggregate base thickness (in) | Corresponding AC layer thickness (in) |
|--|--|--------------------------|-------------------------------|---------------------------------------|
| Light truck traffic (0 to 15 heavy trucks per day in design lane) | Low | 2.89 | 6.0, 8.0, or 10.0 | 6.5, 6.0, or 5.5 |
| | Medium | 2.42 | 6.0, 8.0, or 10.0 | 5.0, 4.5, or 4.0 |
| | High | 1.88 | 6.0, 8.0, or 10.0 | 3.5, 3.0, or 2.5 |
| Medium truck traffic (15 to 50 heavy trucks per day in design lane) | Low | 3.44 | 8.0, 10.0, or 12.0 | 7.5, 7.0, or 6.5 |
| | Medium | 2.90 | 8.0, 10.0, or 12.0 | 6.0, 5.5, or 5.0 |
| | High | 2.27 | 8.0, 10.0, or 12.0 | 4.0, 3.5, or 3.0 |
| Heavy truck traffic (50 to 200 heavy trucks per day in design lane) | Low | 4.19 | 10.0, 12.0, or 14.0 | 9.0, 8.5, or 8.0 |
| | Medium | 3.55 | 10.0, 12.0, or 14.0 | 7.0, 6.5, or 6.0 |
| | High | 2.82 | 10.0, 12.0, or 14.0 | 5.0, 4.5, or 4.0 |

Notes. ¹Low subgrade support: average CBR² ≤ 3%; medium subgrade support: 3% < average CBR ≤ 10%; high subgrade support: average CBR > 10%. ²CBR = California Bearing Ratio (CBR) of the in place subgrade soils. Methods of estimating the CBR of a subgrade soil are provided in section 7 of this document.

Source: Rural Road Design, Maintenance, and Rehabilitation Guide published by SD Dept of Transport

Recent Asphalt Pavement Projects

- **2002 – 7 miles** **County Rd 01A**
- **Total Cost -** **\$267,540**
- **County Share -** **\$135,000**
- **Cost Per Mile** **\$ 38,220**

Recent Asphalt Pavement Projects (Con't)

- **2003 – 8.5 miles** **County Rd 11 North**
- **Total Cost** **\$484,225**
- **County paid entire cost**
- **Cost Per Mile** **\$ 56,976**

Recent Asphalt Pavement Projects (Con't)

- **2004 – 4 miles** **County Rd 1**
- **Total Cost** **\$164,795**
- **Paid with all county funds**
- **Cost Per Mile** **\$ 41,198**

Recent Asphalt Pavement Projects (Con't)

- **2007 – 12.5 miles** **County Rd 14**
- **Total cost** **\$846,463**
- **County Share** **\$446,463 (est)**
- **Cost Per Mile** **\$ 67,717**

Recent Asphalt Pavement Projects (Con't)

- **2008 – 5 miles** **County Rd 9**
- **Total Cost** **\$648,275**
- **County Share** **\$98,275**
- **Cost Per Mile** **\$129,655**

Recent Asphalt Pavement Projects (Con't)

- **2010 – 9 miles** **County Rd 6**
- **Total Cost** **\$939,940**
- **County Share** **\$190,000 (approx)**
- **Cost Per Mile** **\$104,437**

Cost Comparison Over Time

- **Cost Per Mile @ a Low In 2004** **\$ 38,220**
- **Cost Per Mile @ a High in 2008** **\$129,655**
- **Increase over 4 Years** **\$ 91,435**

- **Percentage of Increase** **338%**
- **Since 2004 the Average Budget Increased 27%**
- **Less License Plate increase, Wheel Tax, Opt Out)**

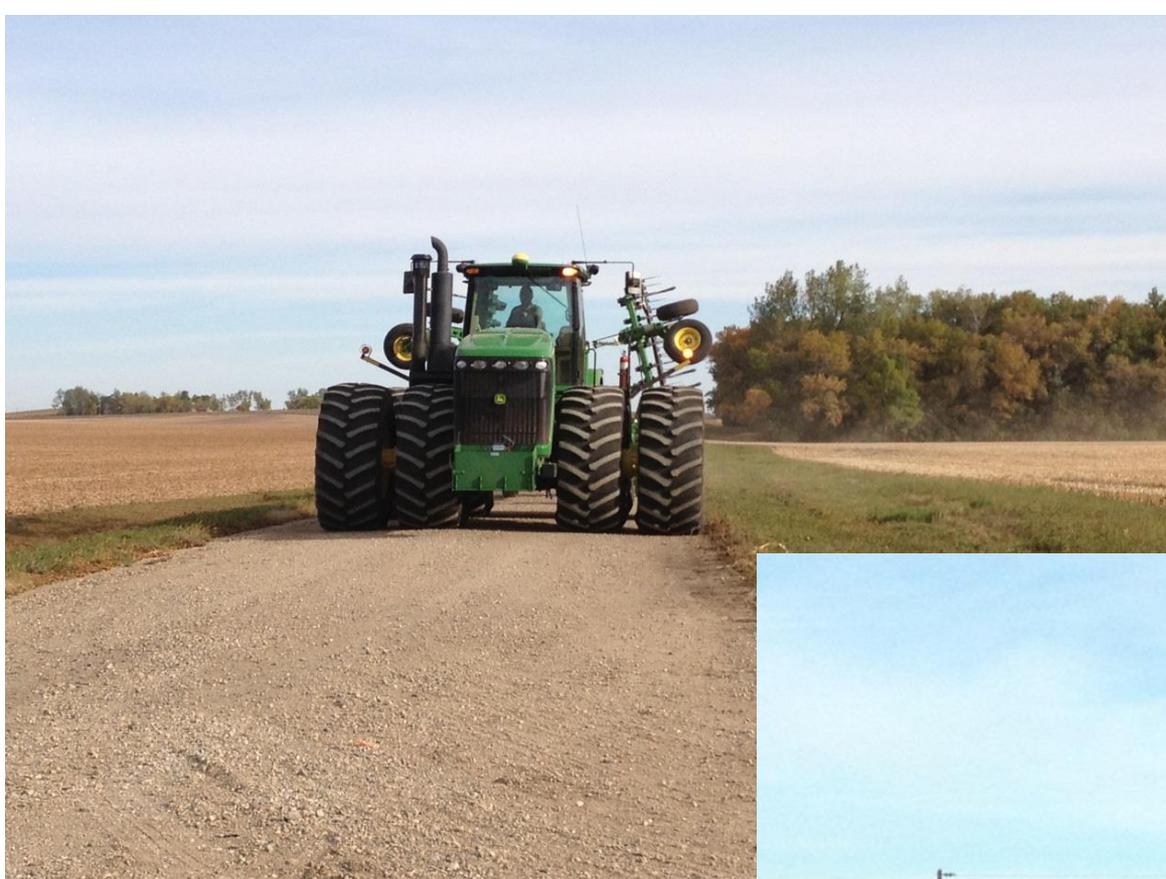
- **Today's Price for 3" overlay is \$197,250 Per/Mile**

Why build stronger and deeper?



Why not build it stronger and deeper

- **Lack of \$ to properly design and build for today's traffic.**
- **Example:**
- **County system (Real numbers)**
- **197 miles of gravel = \$1,083,500**
- **155 miles of asphalt = \$4,650,000**
- **Total to maintain current system = \$5,733,500**
- **Current Highway Budget \$2.4 million**
- **Figured on a 20 year life cycle**
- **No snow removal included**



**What a change
since these roads
were constructed!**



Modern row crop harvest



It's not just agriculture



11/19/2010

Spring 2010 – This was a paved road!



Recovery takes a long time



The aftermath of flooding still affects us



No easy fix here without significant funding increase!



Problem working in 66 ft R-O-W



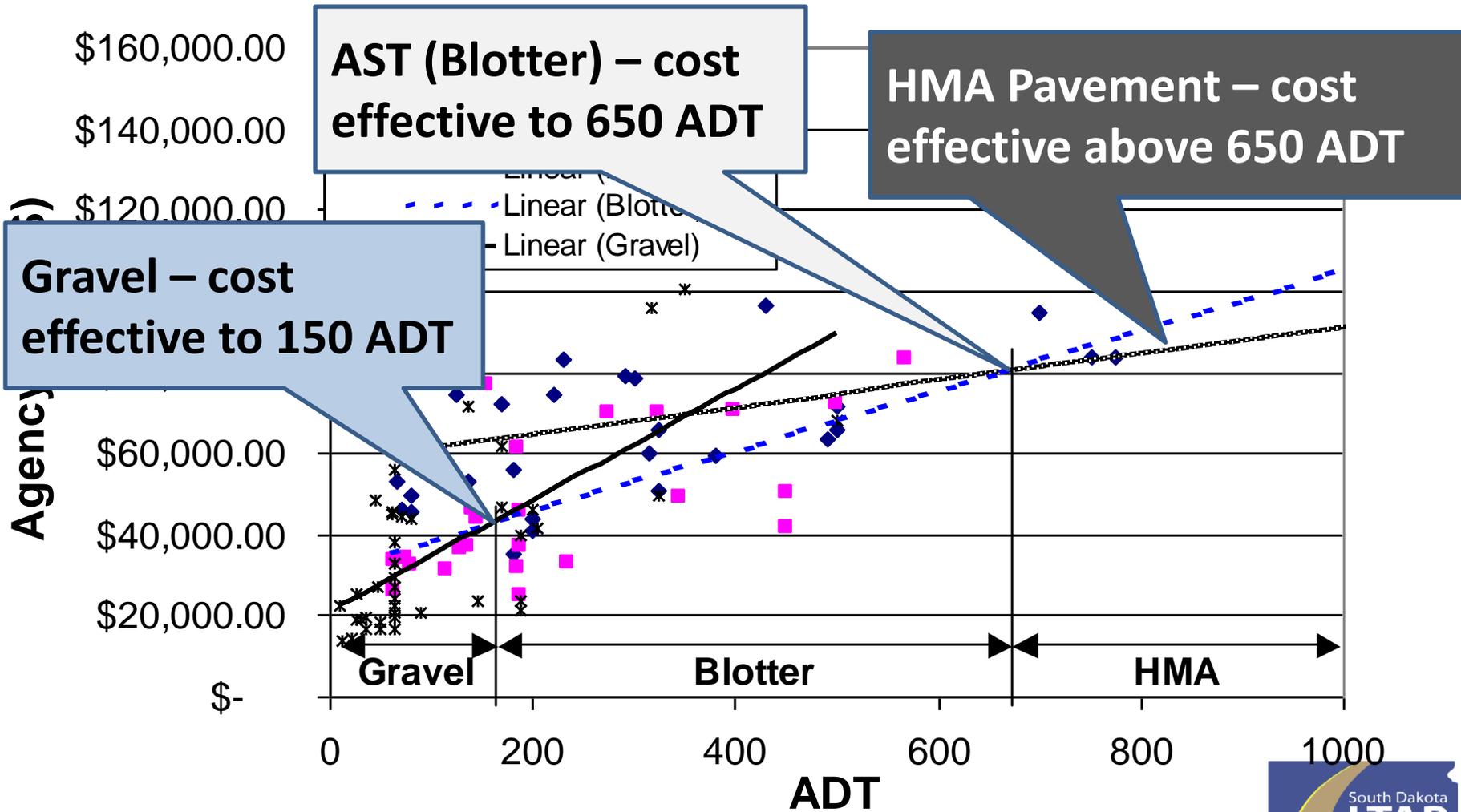
Is Going Back to Gravel the Right Decision?

- This decision needs very careful analysis.
- The SDDOT funded a study of surface selection for local government – completed in 2004.
- Study can be found online at:
http://www.state.sd.us/Applications/HR19ResearchProjects/oneproject_search.asp?projectnbr=SD2002-10
- Please consider a very brief summary on the following slides ---

Local Road Surfacing Criteria Study SDDOT Project 2002-10

- Data provided by 26 counties (120 total roadway sections)
- 20 yr life-cycle cost used in the Study.
- Three surface types analyzed:
 1. Gravel (Stabilized Gravel study also intended, but there was insufficient data for analysis).
 2. Blotter (Asphalt Surface Treatments – This is not pavement, but prime/chip seal on aggregate base)
 3. Hot-mixed Asphalt Pavement

Summary of gravel, AST and HMA surface life cycle costs related to ADT – SDDOT Surface Selection Criteria Study



20 Year Life Cycle Cost / Mile

- **Gravel** **\$103,909**
- **Blotter** **\$349,702**
- **Hot Mixed Asphalt** **\$575,010**

Candidate for turn-back to gravel??



**2,000 to 2,500
vehicles per day!**

03/17/2011

Candidate for turn-back to gravel?



Under 100 vehicles per day

03/29/2011

Road Failure South of Warner



Interesting Digression on this Road:

- Asphalt surface up to approx ten year ago
- Then turned back to gravel
- Now going back to dirt!

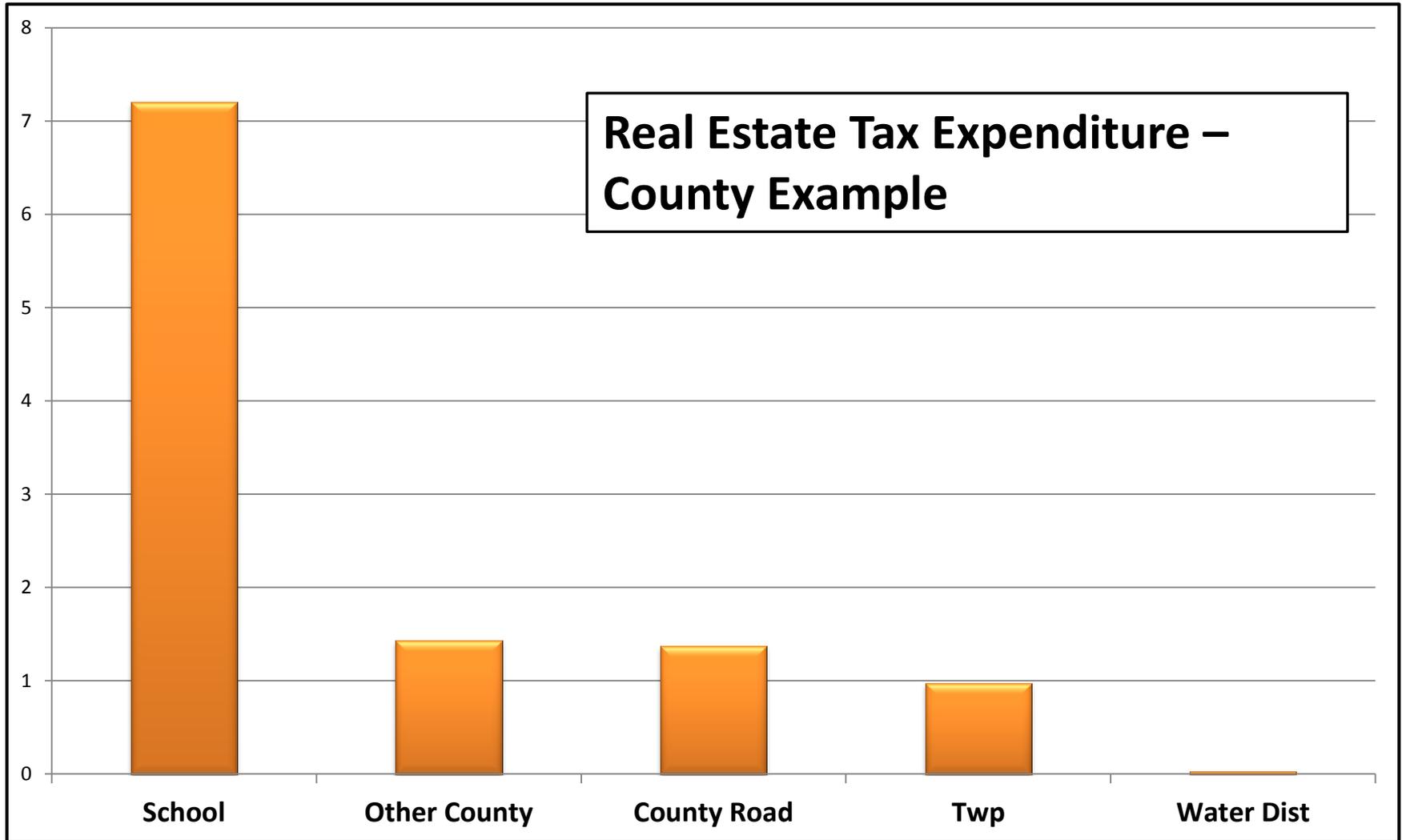
Clark County Highway

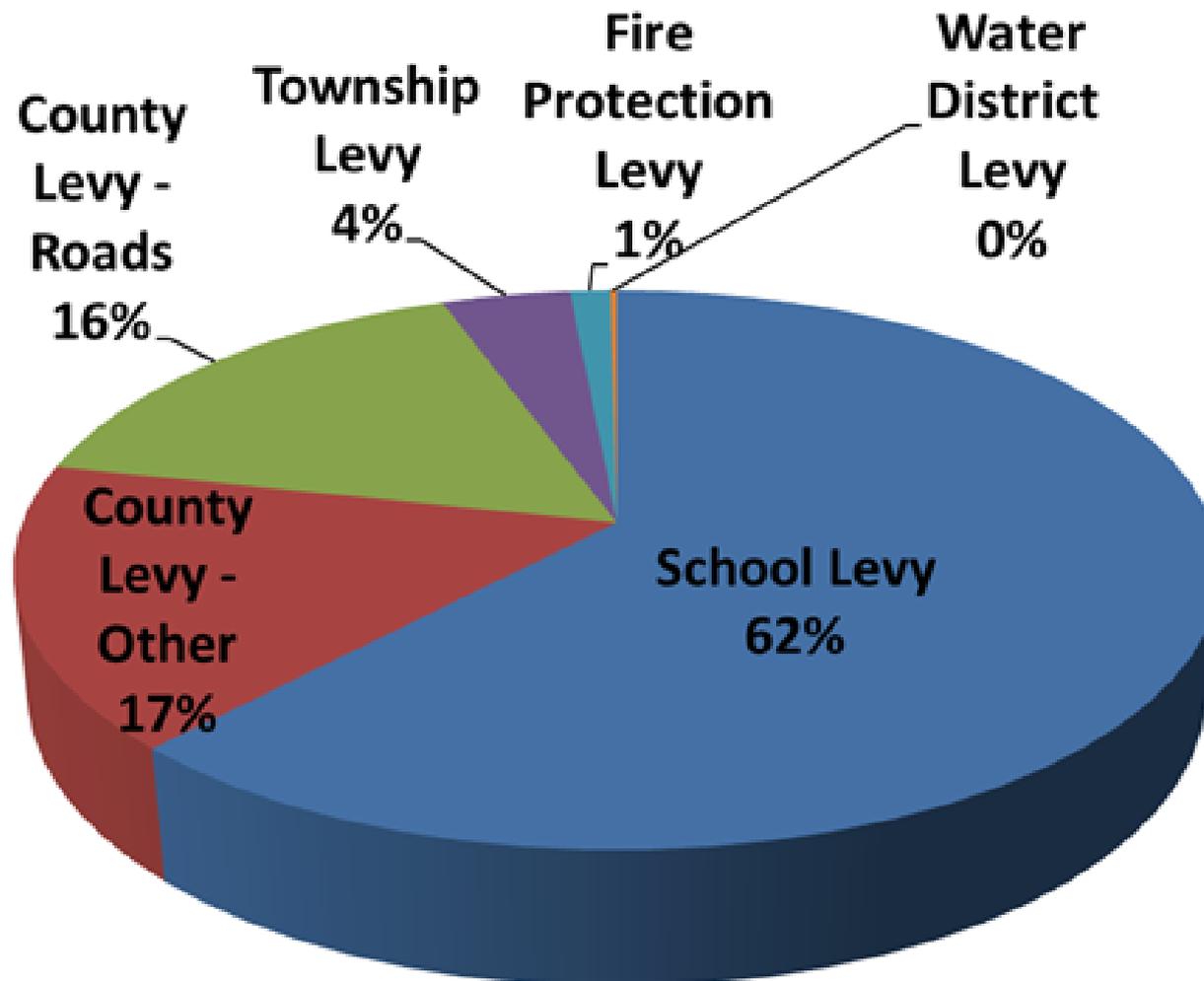


Pavement Maintenance Costs per Mile



The Revenue Stream is not adequate





Breakdown of Real Estate Tax Levy on a 10-Acre Rural Building Site in one SD County

**South Dakota Department of Revenue & Regulation
Division of Motor Vehicles**

**WHEEL TAX BY COUNTY
(*Tax rate indicated is per wheel)**

| COUNTY | RATE WGT < 2001 | RATE WGT 2001 - 4000 | RATE WGT 4001 - 6000 | RATE WGT > 6000 |
|-------------|--------------------|-------------------------|-------------------------|-----------------------|
| MINNEHAHA | 4.00 | 4.00 | 4.00 | 4.00 |
| BROWN | 4.00 | 4.00 | 4.00 | 4.00 |
| BEADLE | 2.00 | 2.00 | 2.00 | 2.00 |
| CODINGTON | 2.00 | 2.00 | 2.00 | 2.00 |
| BROOKINGS | 4.00 | 4.00 | 4.00 | 4.00 |
| YANKTON | 4.00 | 4.00 | 4.00 | 4.00 |
| DAVISON | 2.00 | 2.00 | 2.00 | 2.00 |
| AURORA | 4.00 | 4.00 | 4.00 | 4.00 |
| BENNETT | 4.00 | 4.00 | 4.00 | 4.00 |
| BON HOMME | 2.00 | 2.00 | 2.00 | 2.00 |
| BRULE | 4.00 | 4.00 | 4.00 | 4.00 |
| BUTTE | 2.00 | 2.00 | 2.00 | 2.00 |
| CHARLES MIX | 4.00 | 4.00 | 4.00 | 4.00 |
| CLARK | 4.00 | 4.00 | 4.00 | 4.00 |
| CUSTER | 2.00 | 2.50 | 2.50 | 3.00 |
| DAY | 4.00 | 4.00 | 4.00 | 4.00 |
| DEUEL | 2.00 | 2.00 | 2.00 | 2.00 |
| DOUGLAS | 4.00 | 4.00 | 4.00 | 4.00 |
| FAULK | 4.00 | 4.00 | 4.00 | 4.00 |
| GREGORY | 2.00 | 2.00 | 2.00 | 2.00 |
| GRANT | 4.00 | 4.00 | 4.00 | 4.00 |
| HAAKON | 4.00 | 4.00 | 4.00 | 4.00 |
| HAMLIN | 2.00 | 2.00 | 2.00 | 2.00 |
| HUGHES | 2.00 | 2.00 | 2.00 | 2.00 |
| HUTCHINSON | 3.00 | 3.00 | 3.00 | 3.00 |
| JERAULD | 2.00 | 2.00 | 2.00 | 2.00 |
| LAKE | 4.00 | 4.00 | 4.00 | 4.00 |
| KINGSBURY | 4.00 | 4.00 | 4.00 | 4.00 |
| LINCOLN | 4.00 | 4.00 | 4.00 | 4.00 |
| LYMAN | 4.00 | 4.00 | 4.00 | 4.00 |
| MARSHALL | 4.00 | 4.00 | 4.00 | 4.00 |
| MCCOOK | 4.00 | 4.00 | 4.00 | 4.00 |
| MELLETTE | 4.00 | 4.00 | 4.00 | 4.00 |
| MINER | 4.00 | 4.00 | 4.00 | 4.00 |
| MOODY | 2.00 | 2.00 | 2.00 | 2.00 |
| PERKINS | 2.00 | 2.00 | 2.00 | 2.00 |
| ROBERTS | 4.00 | 4.00 | 4.00 | 4.00 |
| SANBORN | 4.00 | 4.00 | 4.00 | 4.00 |
| SPINK | 4.00 | 4.00 | 4.00 | 4.00 |
| STANLEY | 4.00 | 4.00 | 4.00 | 4.00 |
| SULLY | 4.00 | 4.00 | 4.00 | 4.00 |
| TRIPP | 4.00 | 4.00 | 4.00 | 4.00 |
| TURNER | 2.00 | 4.00 | 4.00 | 4.00 |
| UNION | 4.00 | 4.00 | 4.00 | 4.00 |
| WALWORTH | 4.00 | 4.00 | 4.00 | 4.00 |
| ZIEBACH | 2.00 | 2.00 | 2.00 | 2.00 |

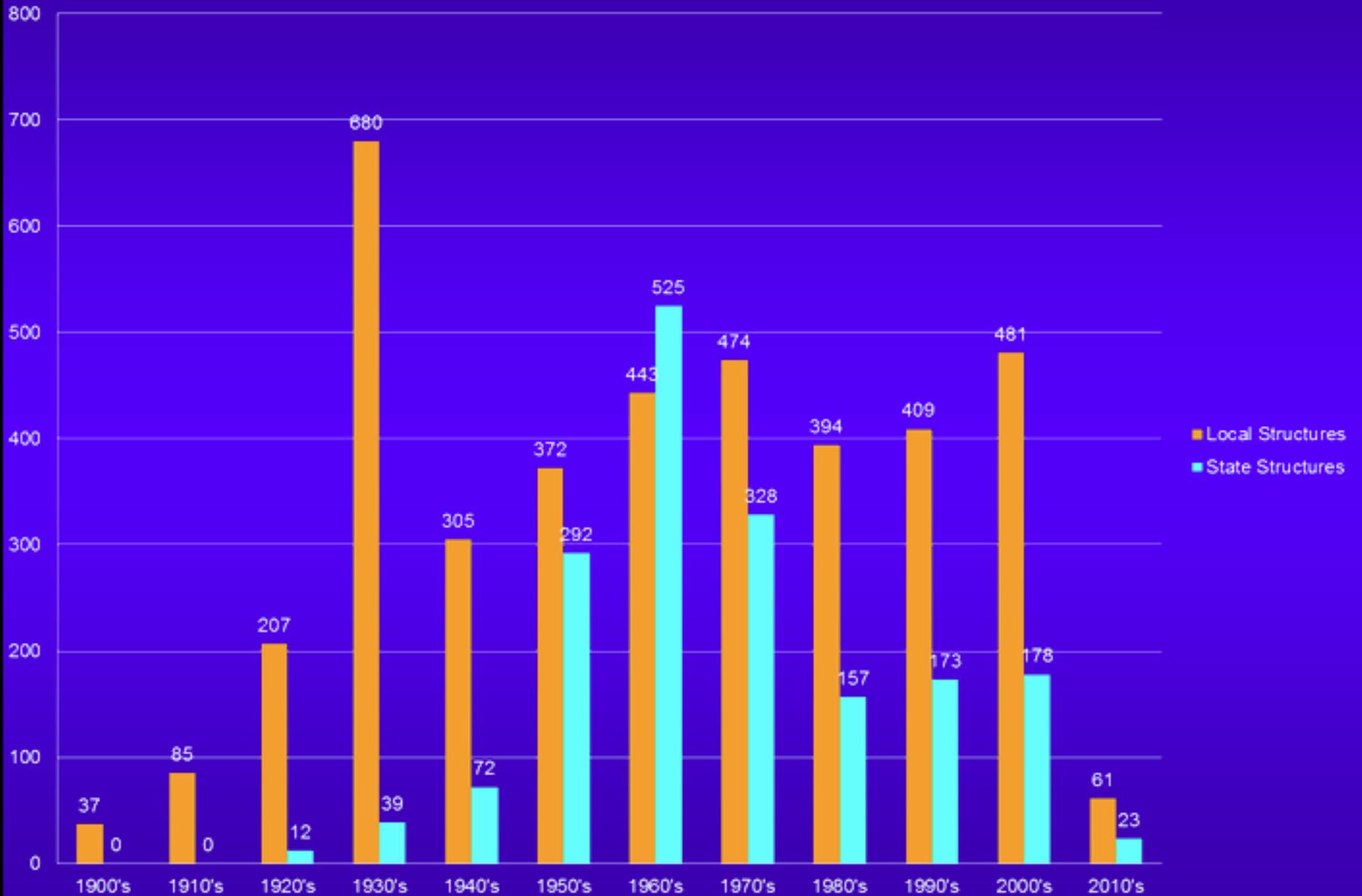
Vehicle Registration – other source of road funding

| <u>Gross Weight</u> | <u>0 - 9 Years Old</u> |
|---------------------|------------------------|
| • 0 - 2,000 lbs. | \$30.00 |
| • 2,001 - 4,000 | \$60.00 |
| • 4,001 - 6,000 | \$90.00 |
| • 6,001 - 10,000 | \$120.00 |

Overview of Bridge Deficiency

- **Back log of the current system**
- **Cost of Bridge Replacement**
- **Priority vs Wants**
- **Future of the Bridge Program?**
- **Bridges Programmed today are scheduled for 2024!**
- **Some Current Info We Have Gathered**

Bridges Built by Decade



Bridges on the County Road System

- **County Government Owned Structures**
- **Bridges (3176)**
- **Culverts (809)**

Bridges on the County Road System (Con't)

- **1045 Structures to be replaced**
- **Average Cost of \$161,000**
- **\$168,245,000 to replace**
- **Current Bridge Construction money for 2014 is \$5.9 million**
- **37 Bridges could be replaced yearly**
- **Equates to 3.5% of deficient bridges**



05/08/2009



There are no easy solutions!

We all need to work together to support increased road and bridge funding.