South Dakota 2008 Local Roads Needs Study

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SD Department of Transportation
November 12, 2008

2008 Interim Study on Highway Needs and Financing

Scope:

- projected long term state and **local highway needs**
- allocation and distribution of responsibility for all highway segments within the state
- future state and **local highway cost projections** compared to projected revenue
- **strategies for creating greater efficiency** in financing state and local roads
- strategies to promote the development of **innovative ideas aimed at reducing highway funding needs**

Presentation Content

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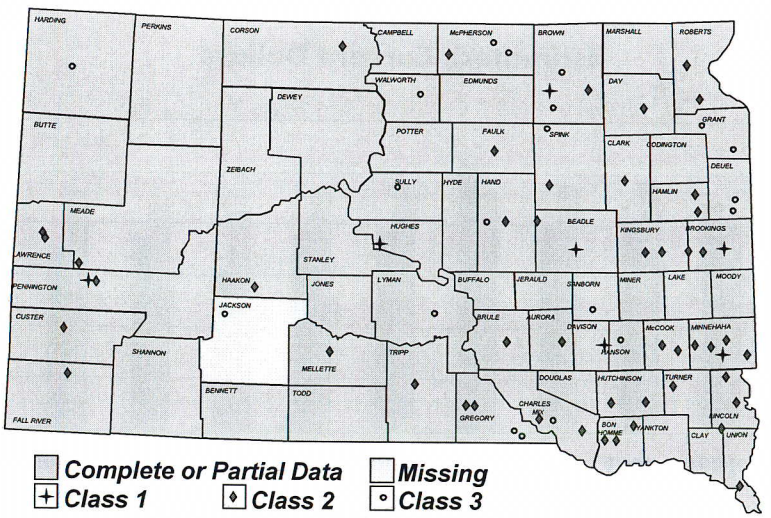
Project Objectives

- Assess current condition of local roads and bridges
- Identify major cost elements affecting changing needs
- Identify objective and appropriate standards for the design, construction, and maintenance of local roads and bridges for use in estimating life-cycle costs
- Estimate current and future funding needs for local roads and bridges
- Identify opportunities and strategies for reducing funding needs and achieving greater efficiency

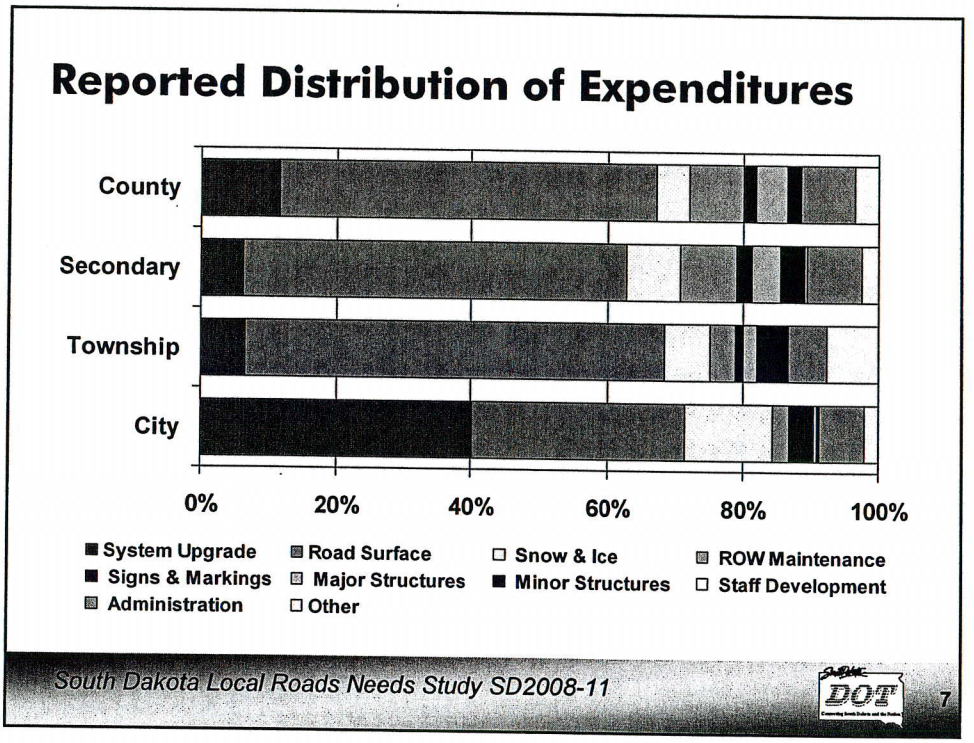
Local Agency Survey

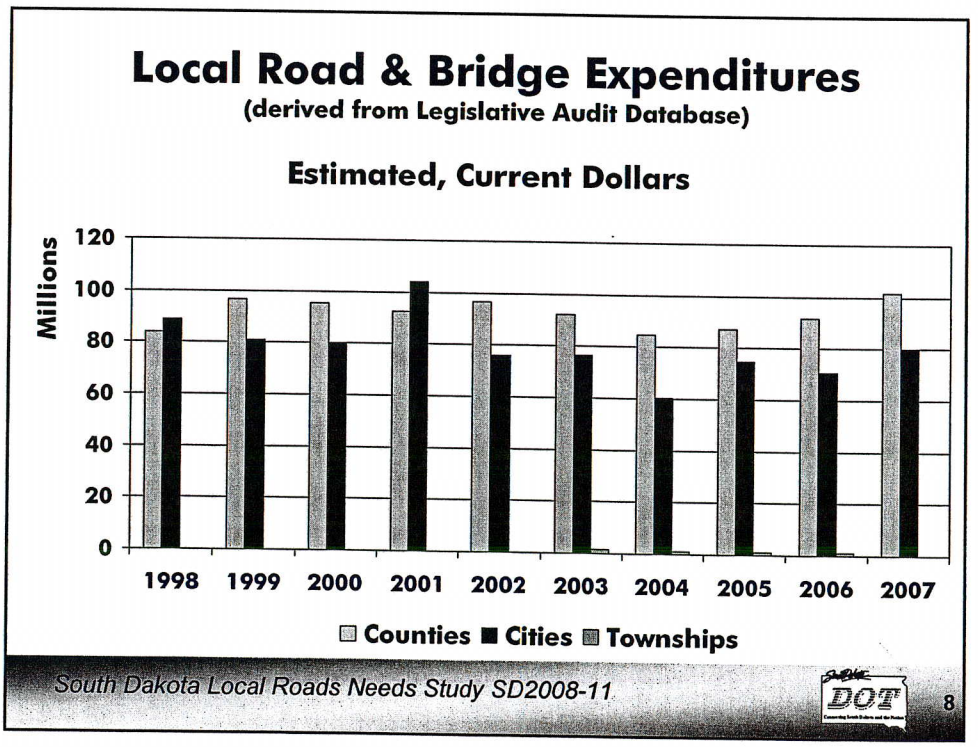
- County Highway Superintendents (65 of 66)
  - County
  - County Secondary
  - Townships
- City Survey
  - Class 1: Street Superintendents (7 of 14)
  - Class 2: Finance Officers or Street Sup's (49 of 105)
  - Class 3: 20-City Sample by SDLTAP Staff (20 of 192)
- Townships (118 of ~945)

Local Agency Survey Responses

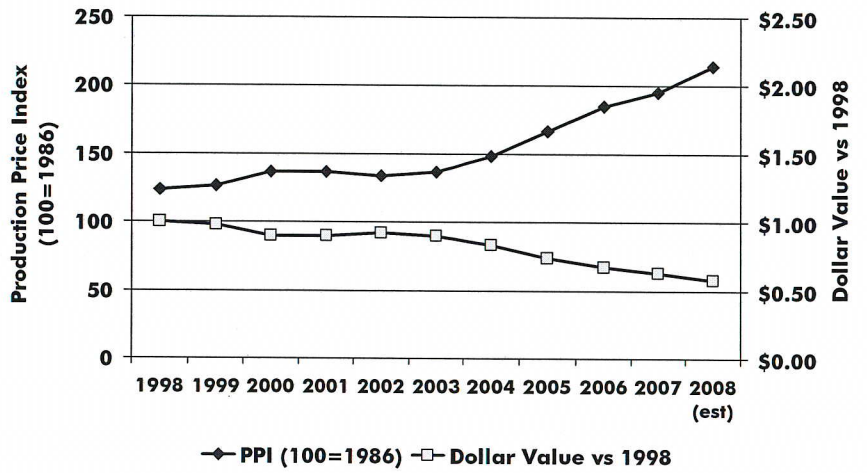


South Dakota 2008 Local Roads Needs Study Interim Report
David Huft, SDDOT Research Program Manager





Highway Construction Production Price Index (US Bureau of Labor Statistics)



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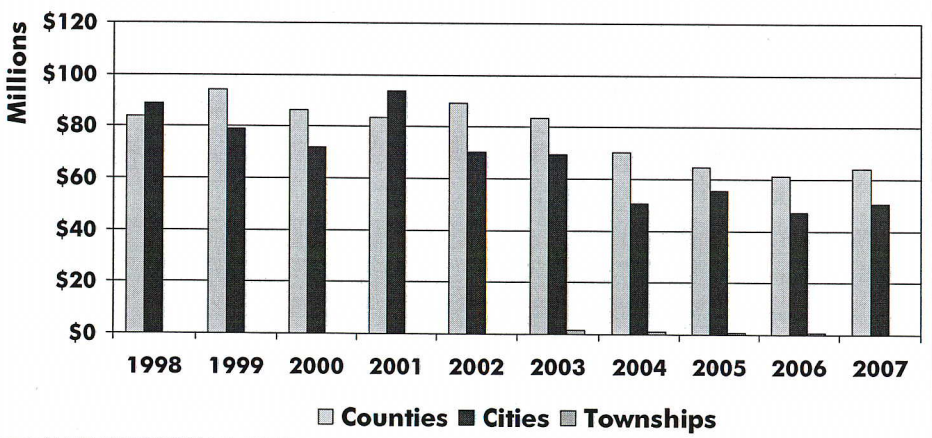
Local Road & Bridge Expenditures

(derived from Legislative Audit Database)

Estimated, in 1998 Dollars



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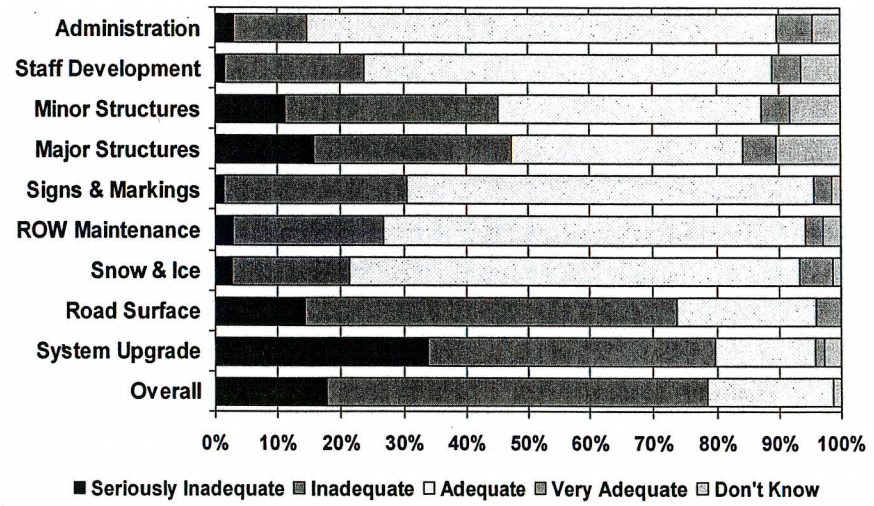
Cities: Perceived Adequacy of Revenues



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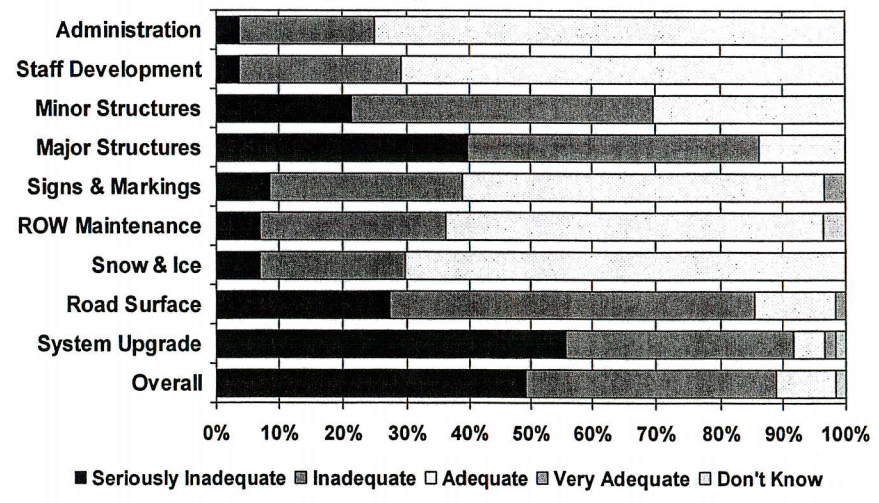
Counties: Perceived Adequacy of Revenues



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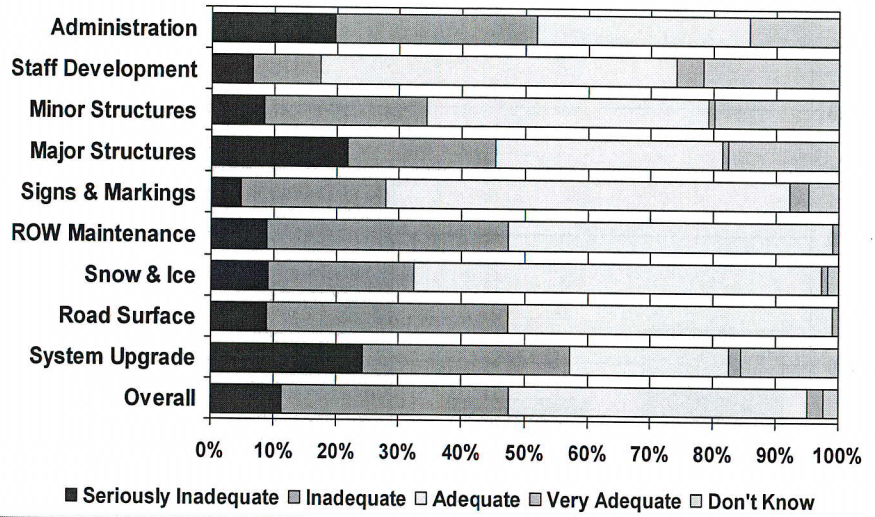
Townships: Perceived Adequacy of Revenues



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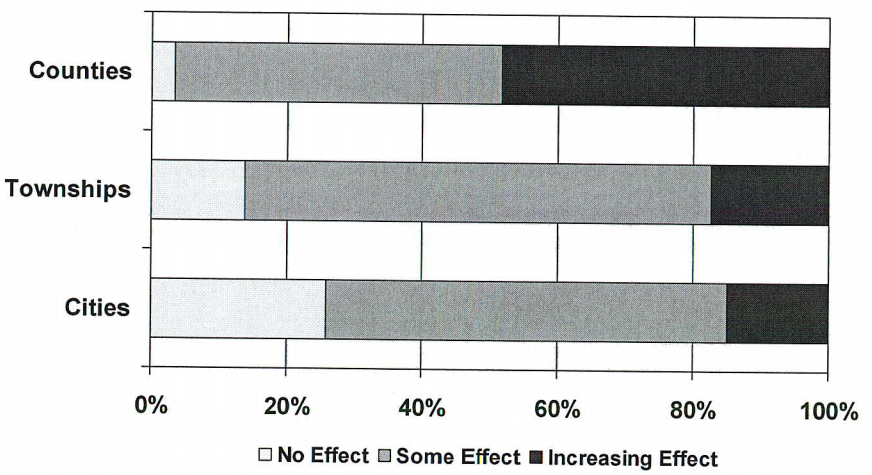
Funding Level Effects on Liability Risk (striping, signing, spot improvements)



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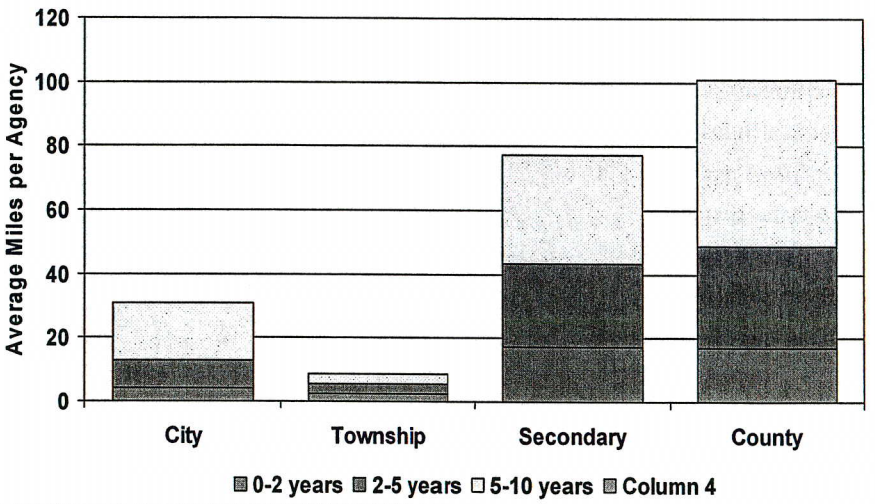
Anticipated Upgrades for Development



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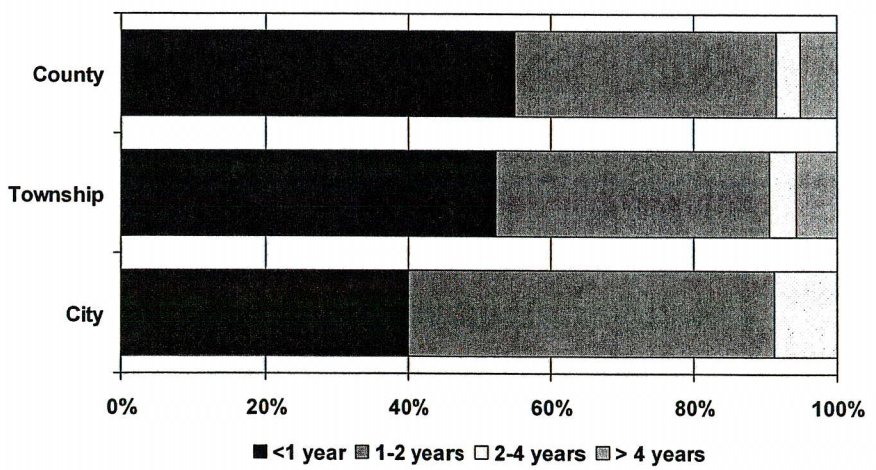
Advance Knowledge of Needed System Upgrade/Expansion



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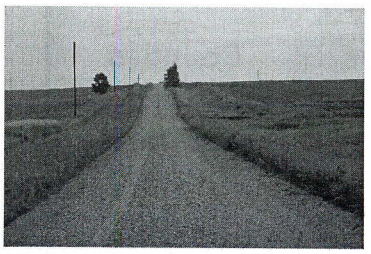
Rural Development Pressure Example (Deuel County, Blom Township)



A large dairy was constructed west of Brandt, SD. The primary access is a gravel road from the dairy to SD Hwy 15. The road had performed quite well for ~50 years with routine blade maintenance and occasionally adding gravel.

Condition of the road after opening of dairy – the road deteriorated further and had to be closed.

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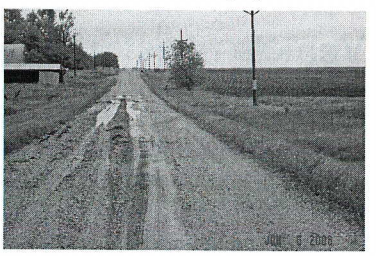
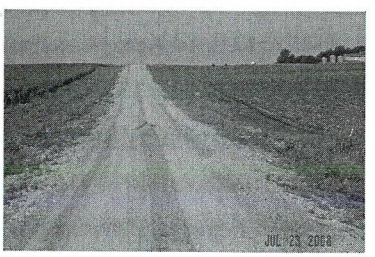
Rural Development Pressure Example (Deuel County, Blom Township)

While the primary access road was closed for repair, this alternate route began to fail.



Approximately $40,000 of local funds have been spent for road improvement thus far.



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Most Critical Items to Agencies

Rank	Cities	Townships	Counties
1	System Upgrade	System Upgrade	System Upgrade
2	Road Surface Maintenance	Road Surface Maintenance	Road Surface Maintenance
3	Structures	ROW Maintenance	Structures
4	Signs & Markings	Administration	Signs & Markings

Perceived Opportunities for Funding

- Vehicle registration fees
- Wheel tax
  - Increase maximum charge (currently $4/wheel)
  - Allow more wheels taxed (currently 4 per vehicle)
  - Adopt in more counties or on statewide basis
- Property tax
  - Opt out of tax freeze
  - Non-highway needs compete for limited funds
  - Some counties have large public land proportion
- Cost sharing by developers

Bridge Need Assessment

- 20-year analysis
- Numbers reflect only structural needs
- Other bridges have functional deficiencies
  - Width
  - Number of lanes
  - Inadequate clearance
- 1098 county bridges are posted for weight
- 139 are recommended to be posted
- 8 county bridges are recommended for closing

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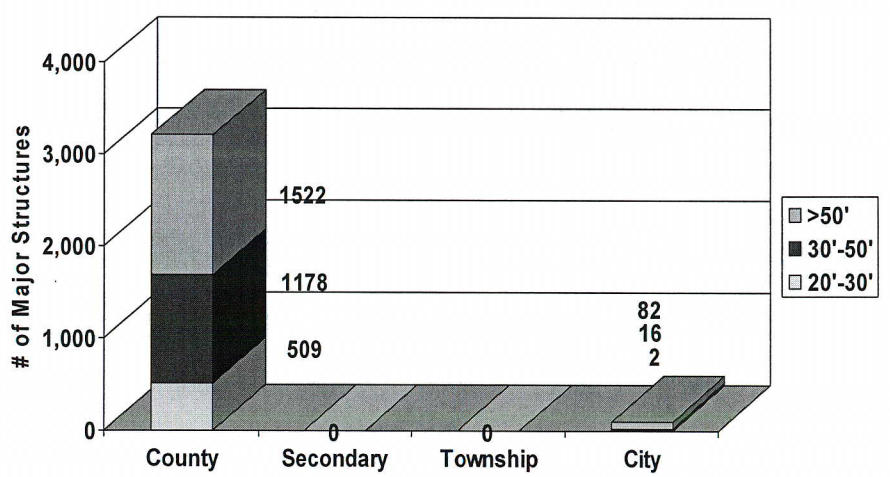
Local Bridge Inventory



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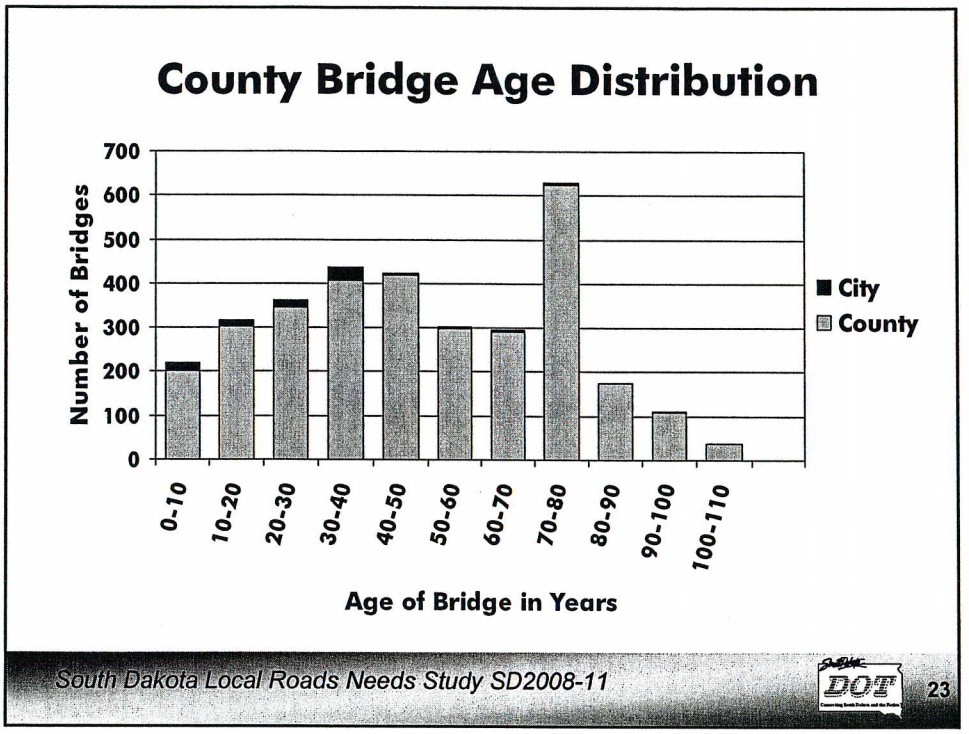
County Bridge Age Distribution
Number of Bridges
700
600
500
400
300
200
100
0
0-10
10-20
20-30
30-40
40-50
50-60
60-70
70-80
80-90
90-100
100-110
City
County
Age of Bridge in Years
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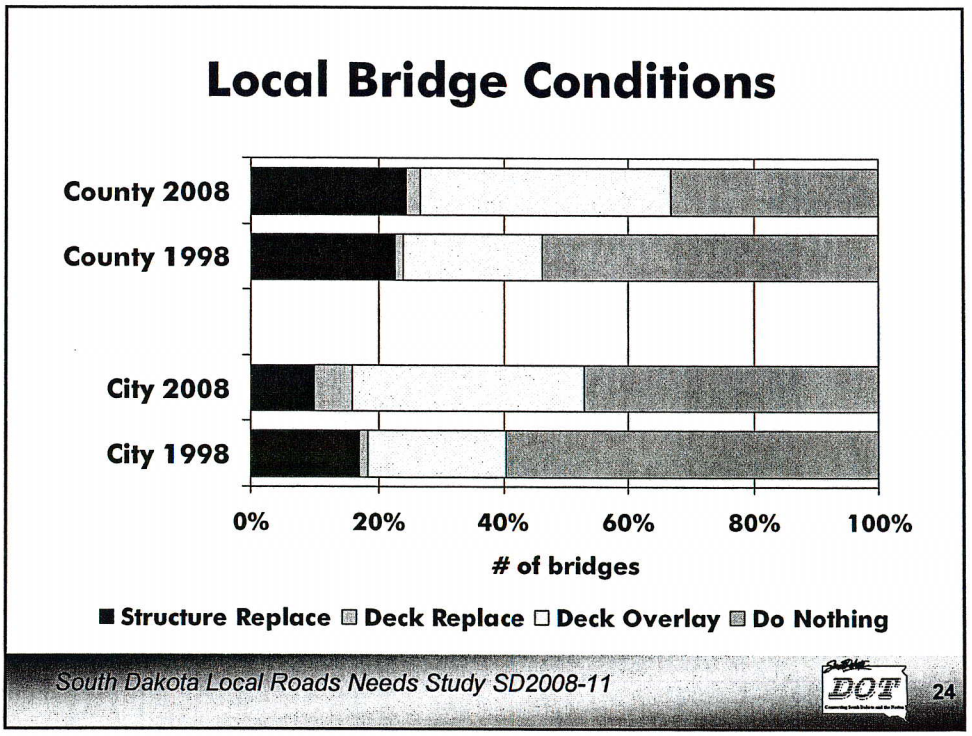
Local Bridge Conditions
County 2008
County 1998
City 2008
City 1998
0%
20%
40%
60%
80%
100%
# of bridges
Structure Replace
Deck Replace
Deck Overlay
Do Nothing
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Bridge Rehabilitation Unit Costs

System	Year	Deck Overlay	Deck Replace	Structure Replace
City	1998	$7	$20	$93
	2008	$18	$55	$202
County	1998	$7	$20	$113
	2008	$33	$82	$255

(all costs per square foot)

Targeted Acceptable Conditions for Calculating Major Structure Needs

System		Replace Bridge	Replace Deck	Overlay Deck	Do Nothing
County	Now	24%	4%	40%	33%
	Target	5%	3%	27%	65%
City	Now	10%	6%	37%	47%
	Target	5%	3%	27%	65%

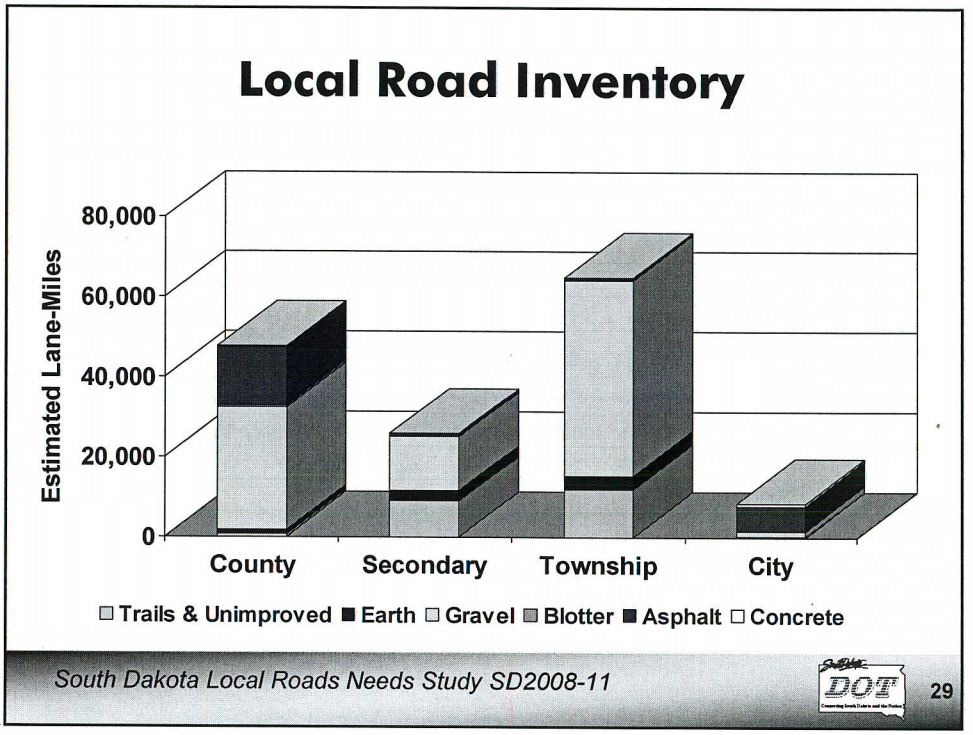
(Target corresponds to 1998 condition of state bridge system)

Major Structure Needs on Local Systems

Jurisdiction	20-Year Need	Annual Need
County	$697.2 M	$34.8 M
City	$54.1 M	$2.7 M
Total	$751.3 M	$37.5 M

Road Surface Need Assessment

- 20-year analysis period
- Based upon
  - SDDOT local road inventory
    - » Surface type for improved roads
    - » Average daily traffic category
    - » Surface width
  - 2008 condition reported by local officials
  - SDDOT estimates of rehab treatment unit costs
  - SDLTAP estimate of unpaved surface maintenance unit costs
  - SD Secondary Road Plan


Local Road Inventory
Estimated Lane-Miles
80,000
60,000
40,000
20,000
0
County
Secondary
Township
City
Trails & Unimproved
Earth
Gravel
Blotter
Asphalt
Concrete
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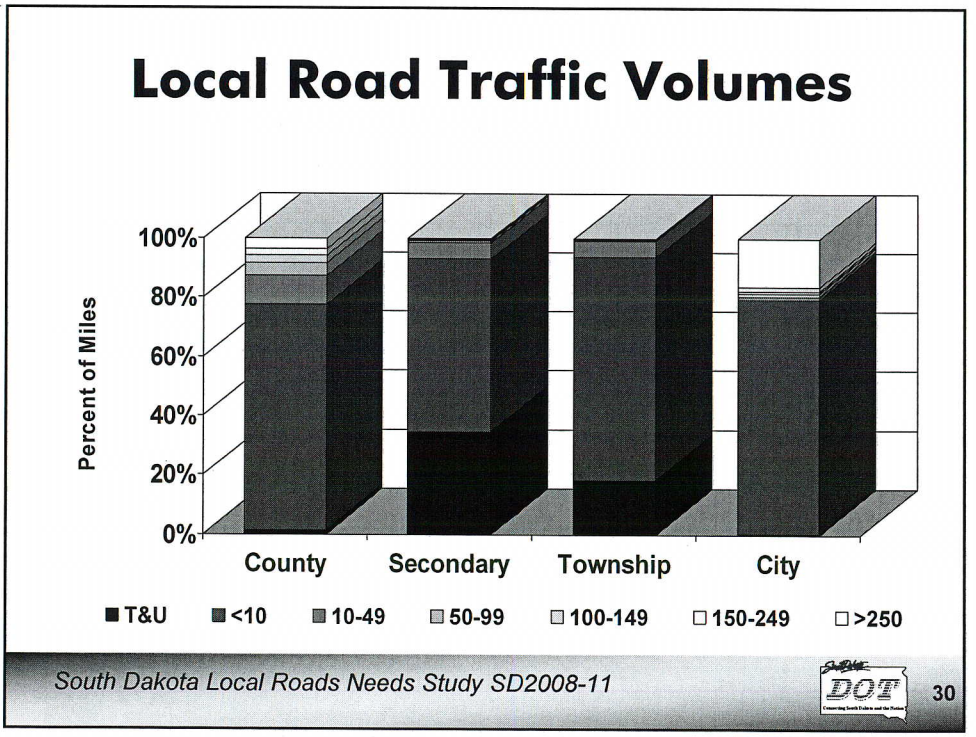
Local Road Traffic Volumes
Percent of Miles
100%
80%
60%
40%
20%
0%
County
Secondary
Township
City
T&U
<10
10-49
50-99
100-149
150-249
>250
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Surface Type & Width Criteria

Existing Surface Type	Average Daily Traffic	Upgrade to Surface Type
Graded & Drained Earth	10 or greater	Gravel
Gravel	150 or greater	Blotter
Blotter	250 or higher	Asphalt
Asphalt	All	No upgrade needed
Concrete	All	No upgrade needed

Jurisdiction	Recommended Roadway Width
County	22 to 26 ft
County Secondary	22 to 24 ft
Township	22 to 24 ft
City	24 to 28 ft

No reconstruction allowed for Average Daily Traffic <50

Local Roads Needing Width or Surface Type Improvement

System	Total Lane-Miles	Width Below Standard	Width Below Standard & ADT>50	Needs Surface Upgrade
County	46,964	24,400	5,750	1,135
Secondary	16,838	12,737	1,266	839
Township	52,894	44,131	3,794	157
City	8,305	3,572	532	203
Total	125,000	84,840	11,341	2,334

Local Road Condition Survey

Pavement Type: Gravel or Crushed Rock				
Condition	PCI	Description (Please Refer to Rural Road Condition Survey Guide for Descriptive Photographs)	Lane-miles DOT Estimate	Lane-miles Your Estimate
Very Good	61-100	The roadway surface is in excellent to very good condition with very good rideability (50 mph). At the upper end of the category, good gravel thickness and excellent drainage (crown and ditches) exist with the only distress being dusting in dry conditions. At the lower end, moderate loose aggregate, slight washboarding, and slight rutting may exist.	12.8	*22.5*
Good	41-60	The roadway surface is in good condition with good rideability and pavement crown (3 to 6"). Adequate gravel thickness exists but additional material is necessary in isolated areas. Moderate washboarding (1 to 2" deep) exists over 10 to 25% of the area and moderate rutting (1 to 2" deep) exists, especially in wet weather. Occasional small potholes (<2" deep) and some loose aggregate (<2" deep) also exist. Adequate primary ditches exist on over 50% of the roadway, but secondary ditches are beginning to develop.	10.0	*24.3*
Fair	21-40	The roadway surface is in fair condition, but travel at slow speeds (<25 mph) is required and there is little or no pavement crown (<3"). Some areas (< 25%) have little or no gravel. Moderate to severe washboarding (>3" deep) exists over 25% of the area and severe rutting (2 to 4" deep) exists on 10 to 20% of the roadway during wet weather. Moderate potholes (2 to 4" deep) exist over 10 to 25% of the area, and severe loose aggregate (4" deep) also exists. Adequate primary ditches exist on less than 50% of the roadway and deep secondary ditches are located along more than 50% of the roadway. Culverts are partially damaged or filled with debris.	715.2	*510.1*
Poor	0-20	The roadway surface is in poor to failed condition. Travel is very difficult, and the roadway crown is bowl-shaped with extensive ponding. Many areas (>25%) have little or no gravel. Severe rutting (>3") exists on more than 25% of the area, especially in wet weather. Severe potholes (4" deep) exist over 25% of the area. Little if any primary ditches exist and deep secondary ditches are located along most of the roadway. Culverts are damaged or filled with debris.	0.0	*164.1*

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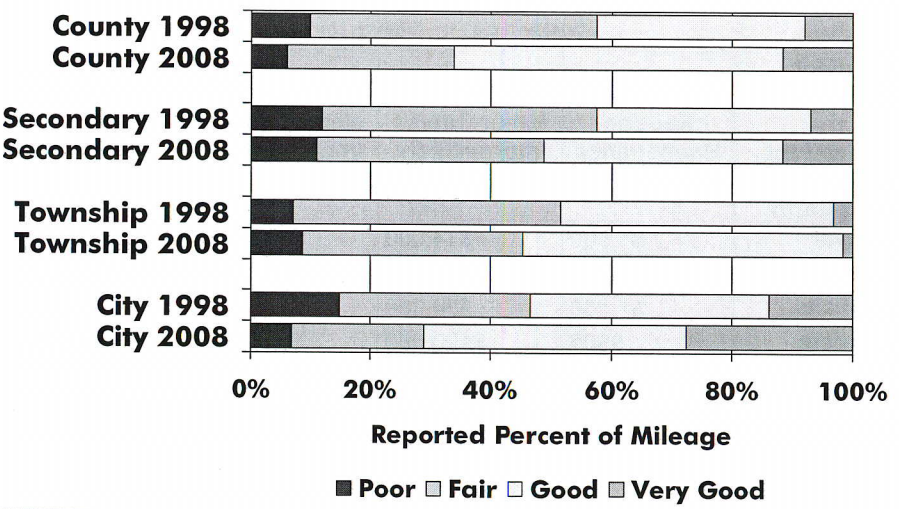
Road Surface Conditions



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Example Road Surface Costs

Treatment	1998	2008
Regrade gravel surface, add 4" gravel	$1.67	$5.80
Reconstruct gravel road, 6" gravel	$13.60	$23.23
Reconstruct 6" base & blotter	$16.16	$26.98
Patch alligator-cracked areas (minor), rout and seal cracks, chip seal	$1.65	$1.87
Mill asphalt surface, patch, 2.5" overlay	$6.68	$12.05
Reconstruct 8" base, 3" asphalt mat	$23.50	$48.05
(all costs per square yard)		

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Typical Roadway Treatment Costs by Surface Type & Condition

Pavement Condition	Very Good	Good	Fair	Poor
Treatment Type	Routine Maintenance	Minor Capital Improvement	Major Capital Improvement	Reconstruct
Graded & Drained Earth	$100	$4,000	$6,000	$155,000
Gravel	$1,500	$14,000	$183,000	$296,000
Blotter	$1,800	$35,000	$211,000	$394,000
Asphalt	$1,400	$84,000	$169,000	$493,000
Concrete	$900	$120,000	$211,000	$845,000

Costs are for a centerline mile of roadway, and vary widely by system

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Targeted Acceptable Conditions for Calculating Road Needs

System		Poor	Fair	Good	Very Good
County	Now	6%	28%	55%	12%
	Target	0%	30%	40%	30%
Secondary	Now	11%	38%	40%	11%
	Target	0%	40%	35%	25%
Township	Now	9%	37%	53%	2%
	Target	0%	40%	35%	25%
City	Now	7%	22%	43%	28%
	Target	0%	35%	35%	30%
Note: Current values rounded to nearest whole percent					

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Annual Road Surface Needs (balanced investment strategy)

System	To Maintain Current Condition			To Achieve Target Condition		
	Rehabilitation	Maintenance	Total	Rehabilitation	Maintenance	Total
County	$56 M	$21 M	$77 M	$68 M	$21 M	$89 M
Secondary	$4 M	$3 M	$8 M	$6 M	$3 M	$9 M
Township	$10 M	$10 M	$20 M	$13 M	$10 M	$23 M
City	$24 M	$ 9 M	$34 M	$26 M	$ 9 M	$35 M
Total	$94 M	$43 M	$137 M	$113 M	$43 M	$156 M

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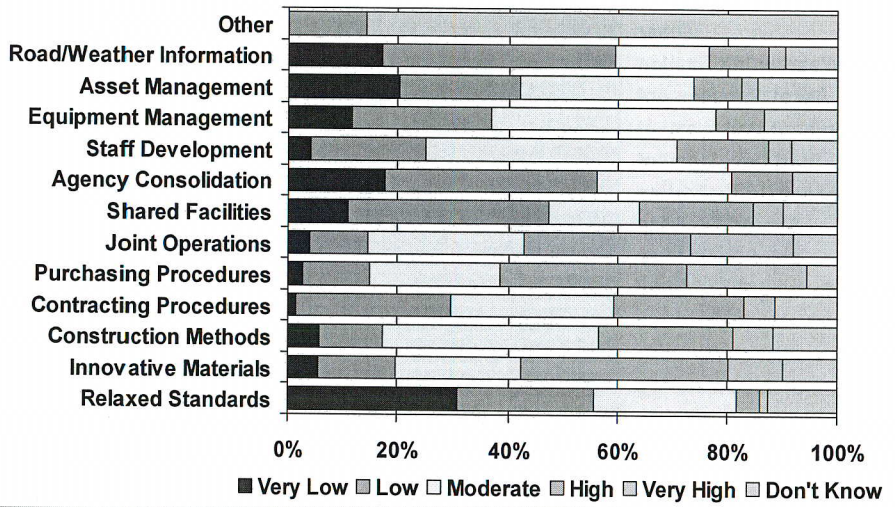
Annual Road Surface Needs ("worst-first" investment strategy)

System	To Maintain Current Condition			To Achieve Target Condition		
	Rehabilitation	Maintenance	Total	Rehabilitation	Maintenance	Total
County	$94 M	$21 M	$115 M	$116 M	$21 M	$137 M
Secondary	$6 M	$3 M	$9 M	$8 M	$3 M	$11 M
Township	$10 M	$10 M	$20 M	$15 M	$10 M	$25 M
City	$29 M	$ 9 M	$38 M	$32 M	$ 9 M	$44 M
Total	$139 M	$43 M	$182 M	$171 M	$43 M	$214 M

Annual Road Surface & Bridge Needs versus Current Annual Expenditures

	County & Secondary	Township	City	Total
Major Structures	$35 M	N/A	$3 M	$38 M
Road Surfaces	$98 M	$23 M	$35 M	$156 M
Total Needs	$143 M	$23 M	$38 M	$224 M
Estimated Expenditures	$55 M	$2 M	$30 M	$160 M
Shortfall	$88 M	$21 M	$8 M	$117 M

Cities: Opportunities for Efficiency



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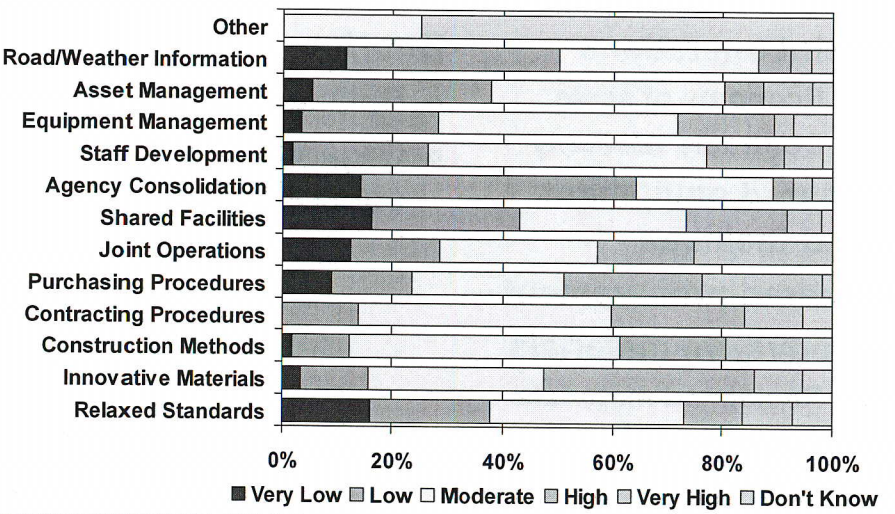
Counties: Opportunities for Efficiency



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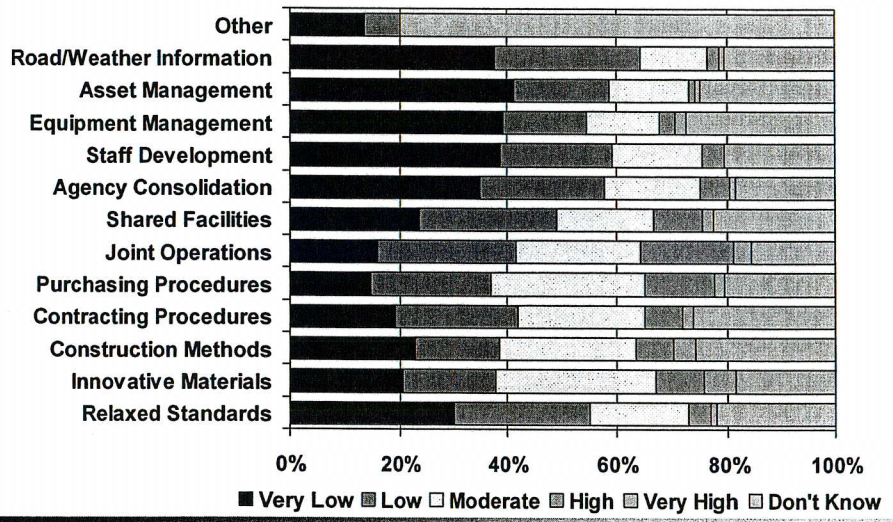
Townships: Opportunities for Efficiency



Perceived Opportunities for Efficiency

- Joint operations
  - Economy of scale
  - Contracts w/county
- Shared equipment and facilities
- Shared procurement
- Innovative materials
  - Reclaimed materials
  - Warm asphalt
  - Dust suppressants

But Not...

- Relaxed standards
- Organizational consolidation

Conclusions: Funding

- Local survey responses indicate serious financial challenges
- Most significant challenges concern providing and maintaining road and bridge infrastructure
- Funding and expenditure levels have remained fairly constant since 1999
- Value of "road dollar" declined >40% 1998-2008
- Agricultural, residential, and industrial development places significant demands on local transportation

Conclusions: Road & Bridge Needs

- Road and bridge condition improved 1998-2008
- Bridge and road surface treatment costs have risen dramatically since 2003
- Overall road and bridge needs have increased since 1998
- Condition will deteriorate at current expenditure levels; gains made in early 90's will erode
- A balance of preventive maintenance and capital improvements will be most cost-effective

Conclusions: Efficiency Opportunities

- Agency Collaboration
- Innovative Materials & Methods
- Asset Management Techniques
  - Data improvements
  - Road surface investment strategies
- Training & Staff Development
  - Value underappreciated
  - Technical challenges of local road management are not well recognized
  - Needed for maximum investment efficiency

Conclusions: Data Needs

- Local road system inventories are not current
  - Development in growth counties & cities
  - Abandonment in rural counties
  - Pending SDDOT research suggestion on procedures
- Financial reporting is incomplete
  - City capital improvements grouped with buildings
- Outdated data impedes
  - Statewide analysis
  - Local roadway management
- Any funding distribution formula adjustments should use current information carefully

Project Technical Panel

- Richard Benda
  SD Dept. of Tourism & Economic Development
- Robin Bobzien
  American Public Works Assn.
- Gail Brock
  SD Assn. of Towns & Townships
- Toby Crow
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  American Concrete Paving Assn.
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  Ag Unity
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  SDDOT Research
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  SDDOT Local Programs
- Ben Orsbon
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  SD Highway Superintendents
- Hal Rumpca
  SDDOT Research
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  Local Transportation Assistance Program
- Ken Swedeen
  Dakota Asphalt Paving Assn.
- Yvonne Taylor
  SD Municipal League
- Todd Thompson
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- Jeff Des Lauriers
  City of Sioux Falls
- Bob Wilcox
  SD County Commissioners Assn.
- Dale Tech
  SD Street Superintendents Assn.

Acknowledgements

- SD Association of Towns & Townships
- SD Association of Counties
- SD Municipal League
- SD Local Transportation Assistance Program
- SD Department of Tourism & State Development
- SDDOT Offices of Bridge Design, Project Development, Research, Local Programs
- Applied Pavement Technology

Questions?

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