

## South Dakota 2008 Local Roads Needs Study

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SD Department of Transportation  
November 12, 2008

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1

## 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

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2

## Presentation Content

| Section         | Topic                    | Slides  |
|-----------------|--------------------------|---------|
| Introduction    | Study Objectives         | 1 – 6   |
| Local Finances  | Expenditures             | 7 – 10  |
|                 | Funding Adequacy         | 11 – 20 |
| Need Assessment | Bridge Needs             | 21 – 26 |
|                 | Road Surface Needs       | 27 – 40 |
| Conclusions     | Efficiency Opportunities | 41 – 44 |
|                 | Conclusions              | 45 – 48 |
|                 | Acknowledgements         | 49 – 50 |
|                 | Discussion, Q&A          | 51      |

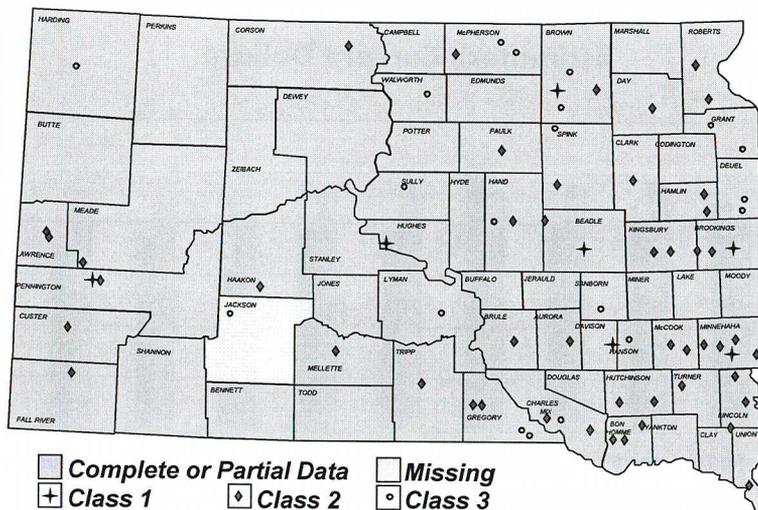
## Project Objectives

- 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

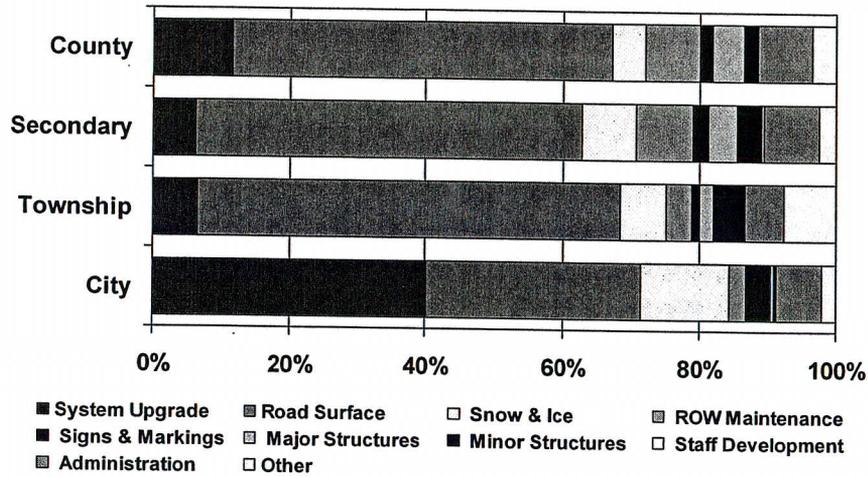
- **County Highway Superintendents (65 of 66)**
  - County
  - County Secondary
  - Townships
- **City Survey**
  - Class 1: Street Superintendents (7 of 14)
  - Class 2: Finance Officers or Street Sup's (49 of 105)
  - Class 3: 20-City Sample by SDLTAP Staff (20 of 192)
- **Townships (118 of ~945)**

## Local Agency Survey Responses



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### Reported Distribution of Expenditures



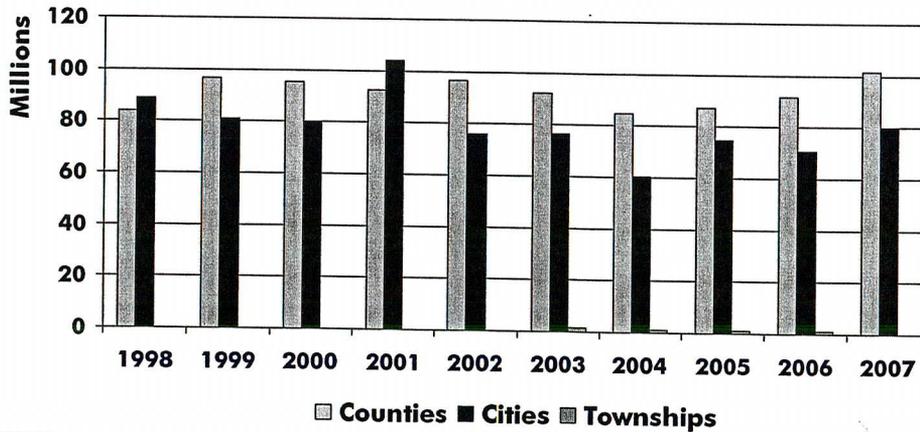
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### Local Road & Bridge Expenditures

(derived from Legislative Audit Database)

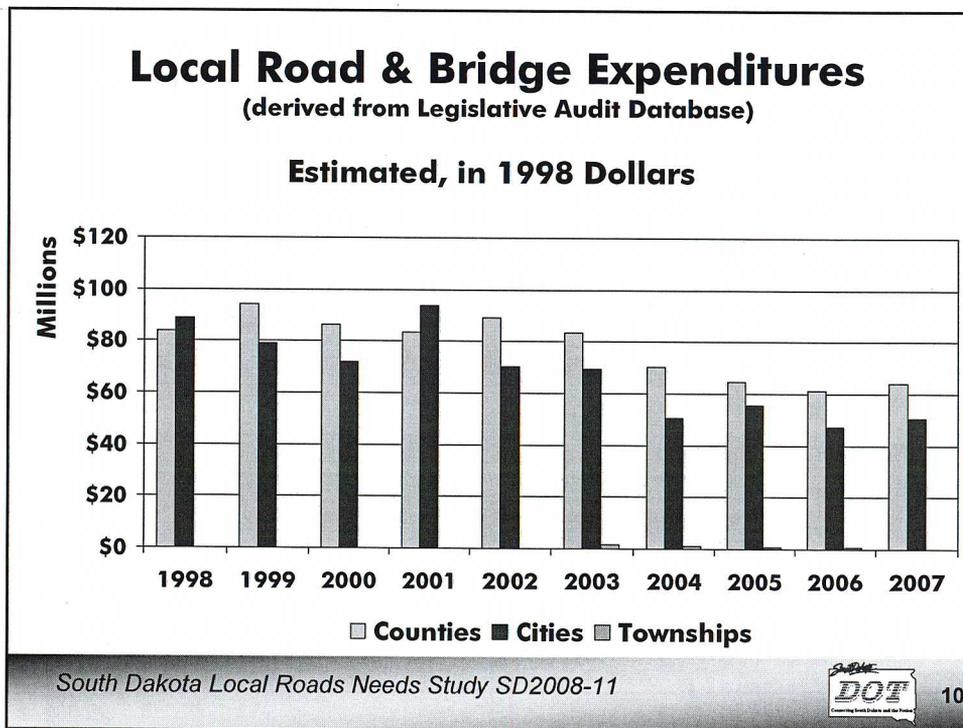
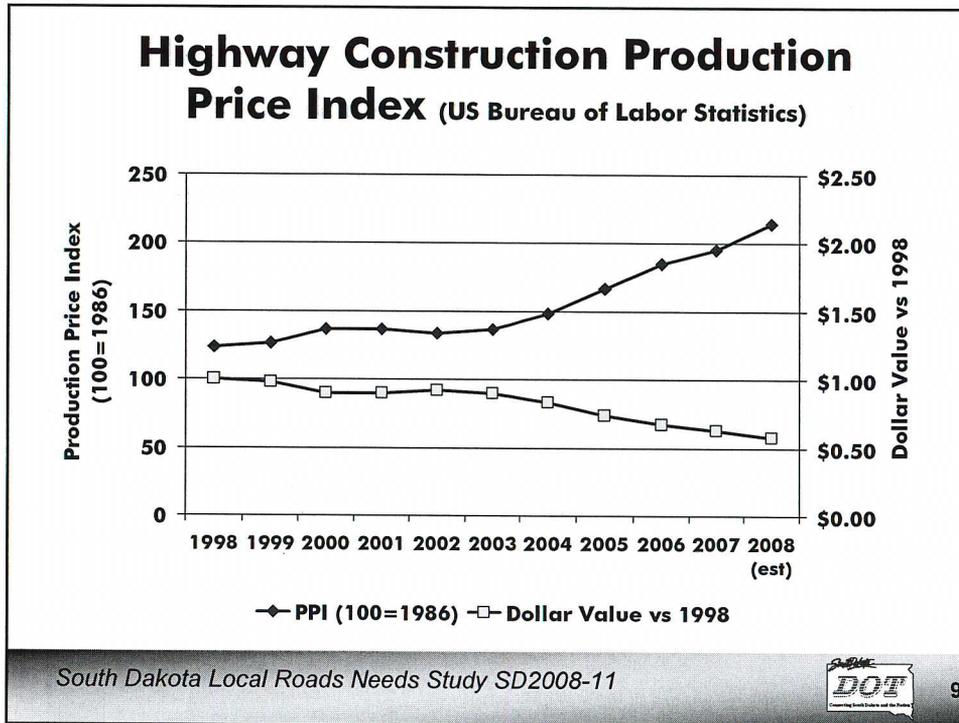
Estimated, Current Dollars



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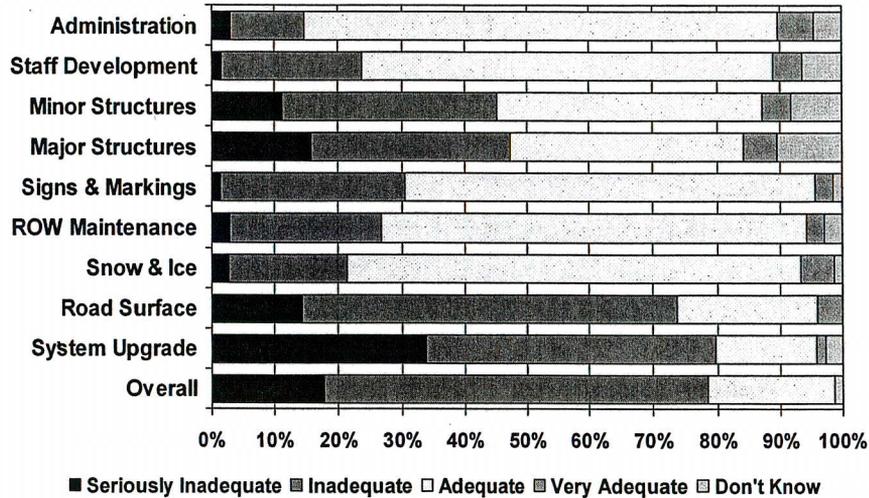


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**Cities:**  
**Perceived Adequacy of Revenues**

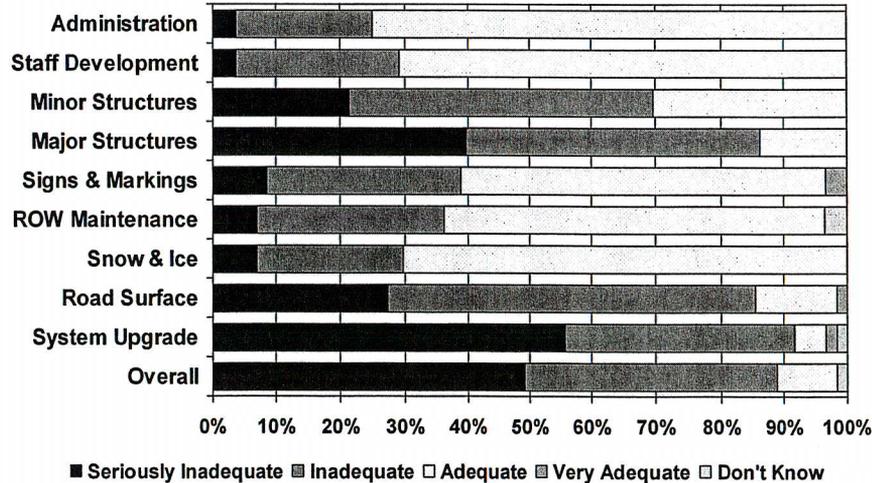


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11

**Counties:**  
**Perceived Adequacy of Revenues**



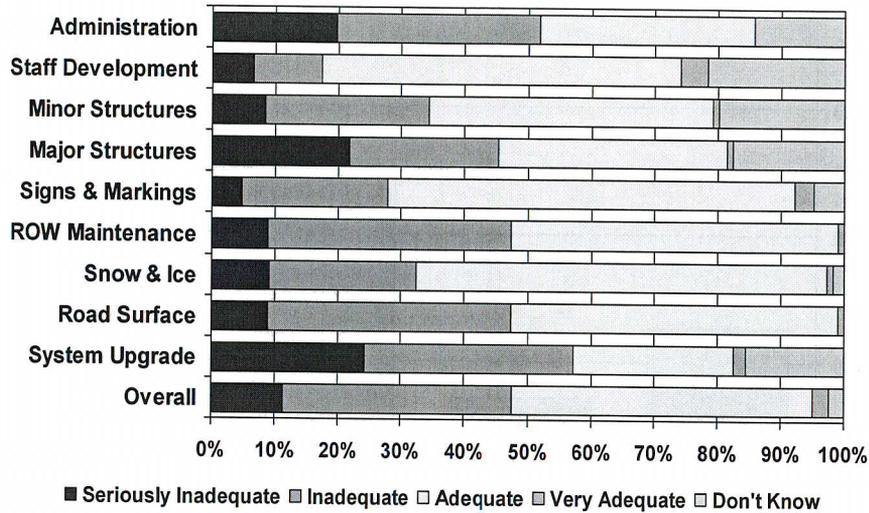
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12

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**Townships:  
 Perceived Adequacy of Revenues**

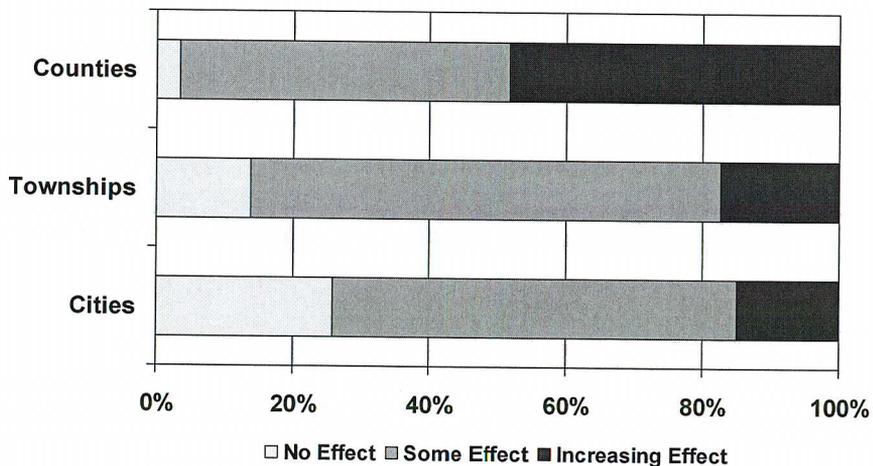


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13

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

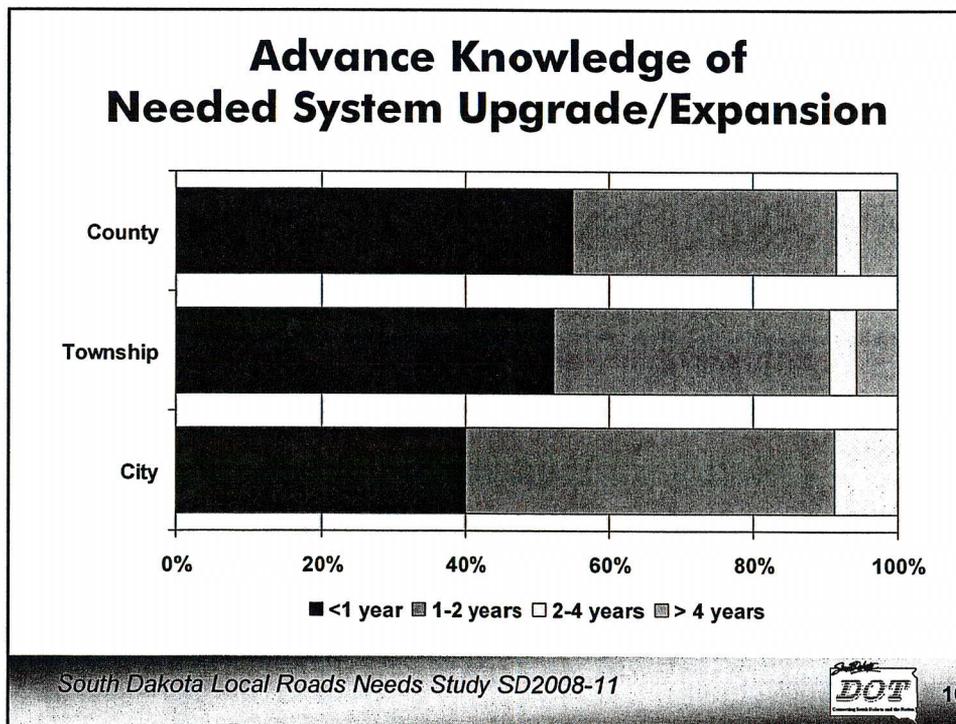
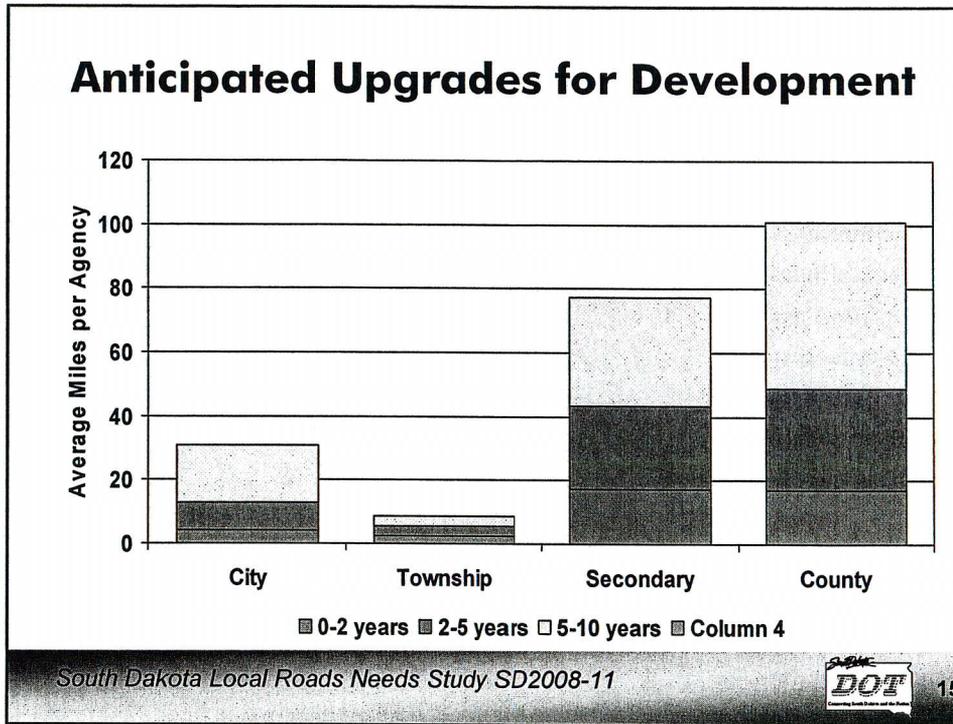


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14

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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.

## 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.



### 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

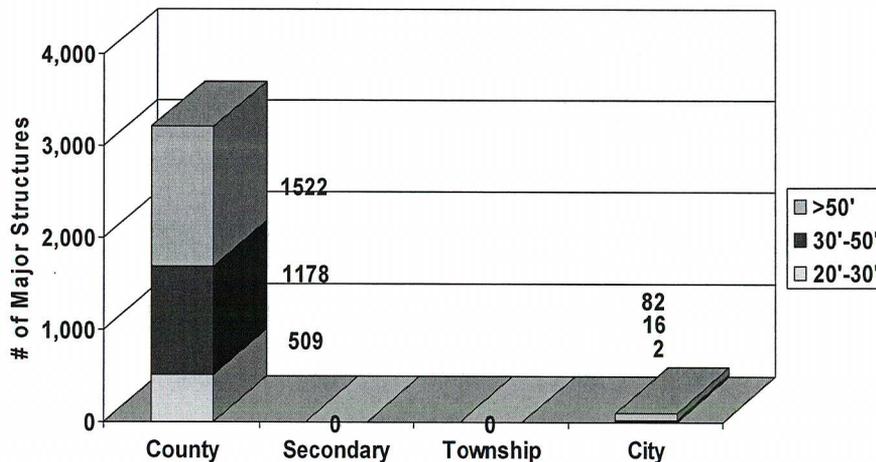
- 20-year analysis
- Numbers reflect only structural needs
- Other bridges have functional deficiencies
  - Width
  - Number of lanes
  - Inadequate clearance
- 1098 county bridges are posted for weight
- 139 are recommended to be posted
- 8 county bridges are recommended for closing

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21

## Local Bridge Inventory

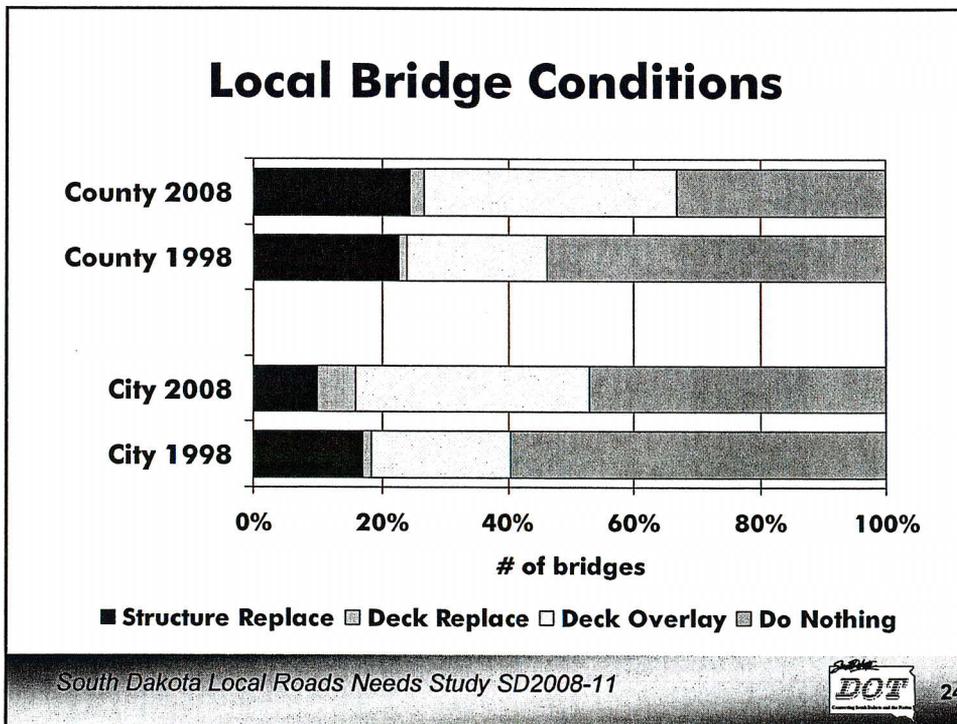
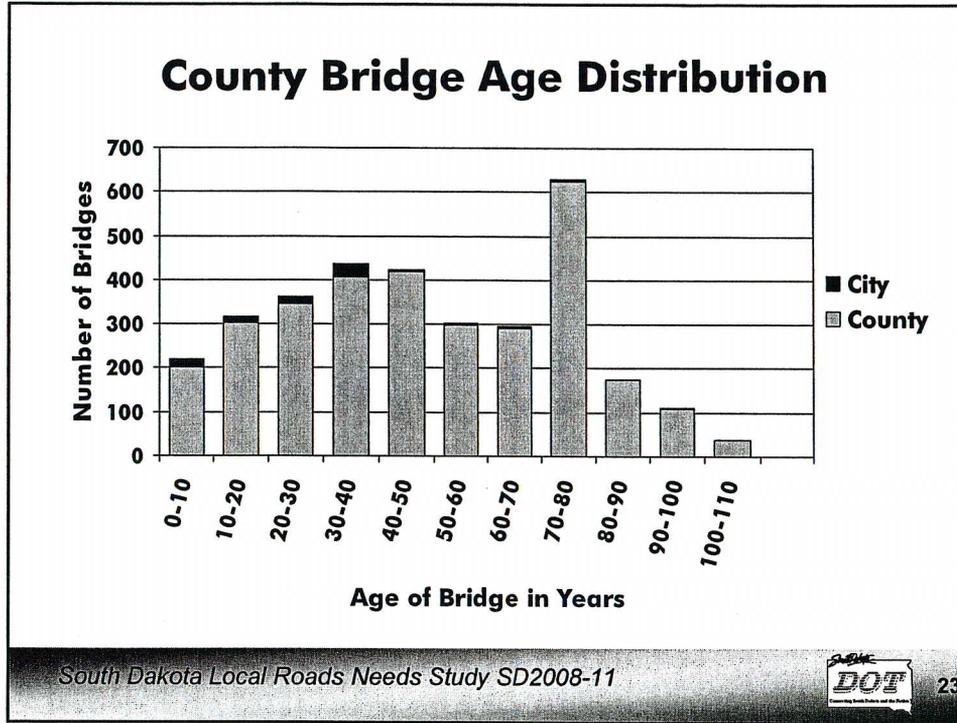


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22

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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    |

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27

## Road Surface Need Assessment

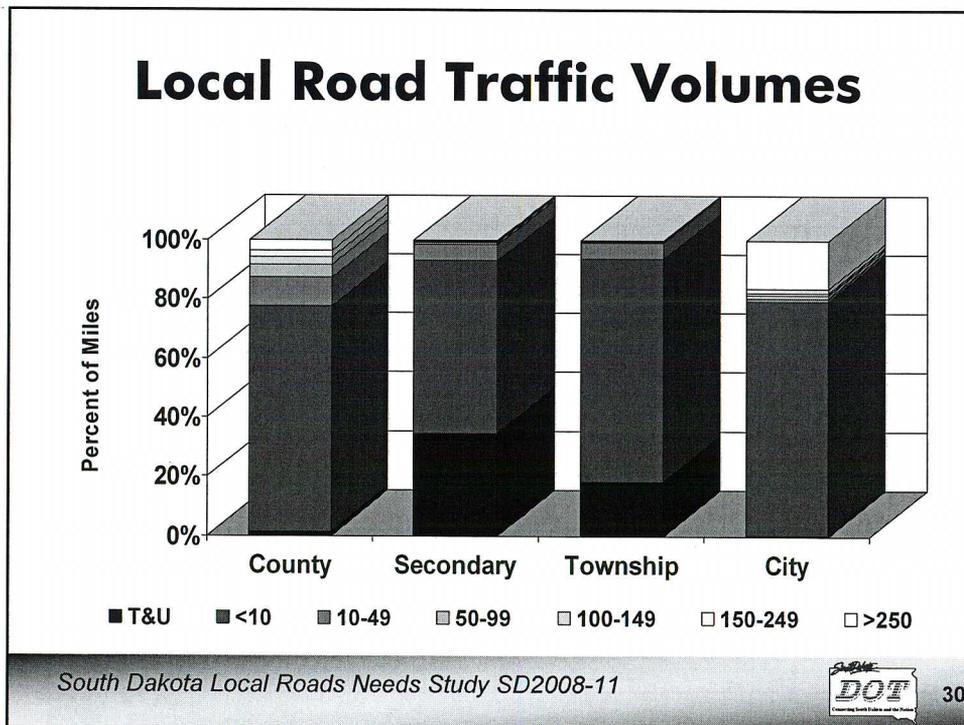
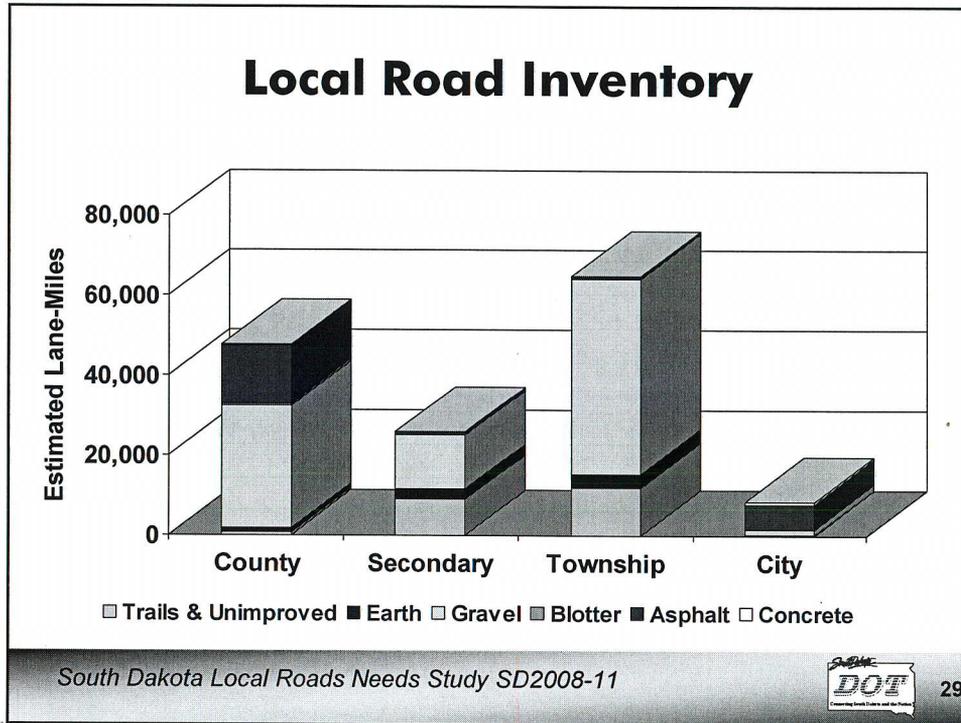
- 20-year analysis period
- Based upon
  - SDDOT local road inventory
    - » Surface type for improved roads
    - » Average daily traffic category
    - » Surface width
  - 2008 condition reported by local officials
  - SDDOT estimates of rehab treatment unit costs
  - SDLTAP estimate of unpaved surface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

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28

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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                   |
| <b>Total</b> | <b>125,000</b>   | <b>84,840</b>        | <b>11,341</b>                 | <b>2,334</b>          |



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## Local Road Condition Survey

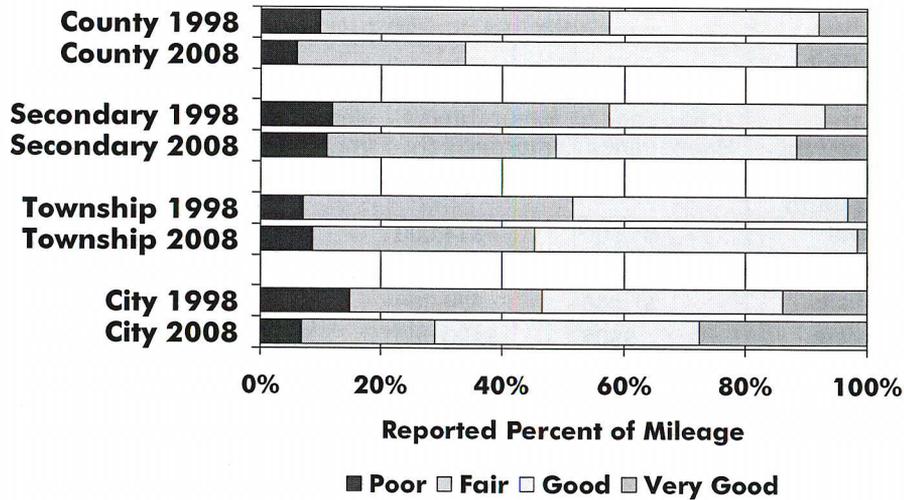
| Pavement Type: Gravel or Crushed Rock |        |   |                         |                          |
|---------------------------------------|--------|---|-------------------------|--------------------------|
| Condition                             | PCI    | Description (Please Refer to Rural 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                    | <i>22.5</i>              |
| 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                    | <i>24.3</i>              |
| 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. <b>Culverts are partially damaged or filled with debris.</b> | 715.2                   | <i>510.1</i>             |
| 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. <b>Culverts are damaged or filled with debris.</b>  | 0.0                     | <i>164.1</i>             |

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33

## Road Surface Conditions



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34

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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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35

### 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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36

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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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37

## 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         |
| <b>Total</b> | <b>\$94 M</b>                 | <b>\$43 M</b> | <b>\$137 M</b> | <b>\$113 M</b>              | <b>\$43 M</b> | <b>\$156 M</b> |

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38

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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   |
| <b>County</b>    | \$94 M                        | \$21 M      | \$115 M | \$116 M                     | \$21 M      | \$137 M |
| <b>Secondary</b> | \$6 M                         | \$3 M       | \$9 M   | \$8 M                       | \$3 M       | \$11 M  |
| <b>Township</b>  | \$10 M                        | \$10 M      | \$20 M  | \$15 M                      | \$10 M      | \$25 M  |
| <b>City</b>      | \$29 M                        | \$9 M       | \$38 M  | \$32 M                      | \$9 M       | \$44 M  |
| <b>Total</b>     | \$139 M                       | \$43 M      | \$182 M | \$171 M                     | \$43 M      | \$214 M |

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39

## Annual Road Surface & Bridge Needs versus Current Annual Expenditures

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

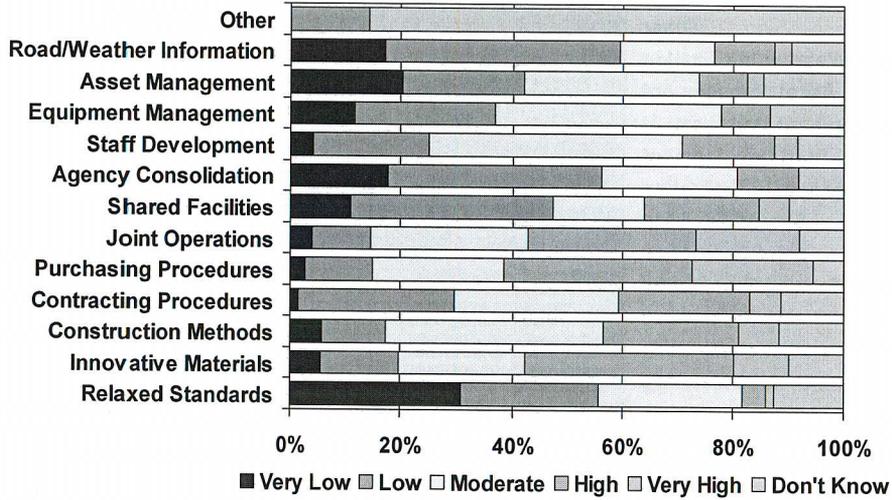
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40

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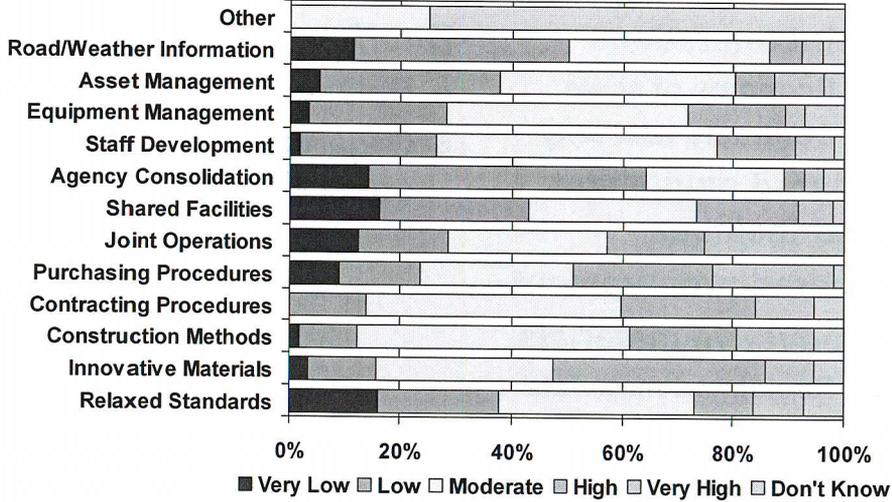
### Cities: Opportunities for Efficiency



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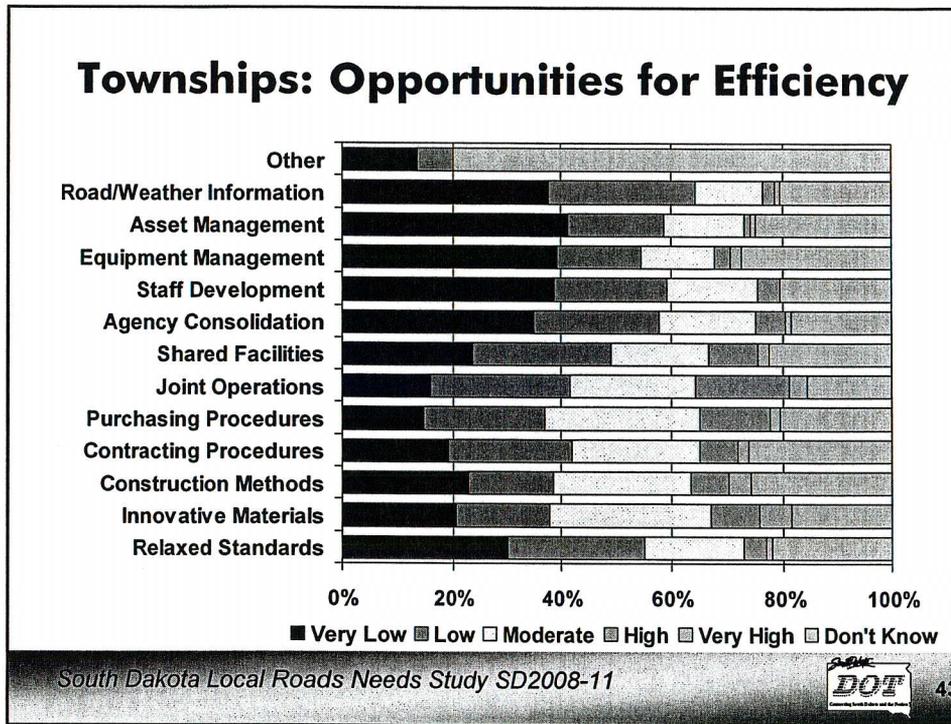
### Counties: Opportunities for Efficiency



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- ### 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**
- South Dakota Local Roads Needs Study SD2008-11 44

## 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

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45

## 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

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46

## **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

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47

## **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**

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48

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## 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  
Associated General Contractors
- Larry Engbrecht  
American Concrete Paving Assn.
- Brenda Forman  
Ag Unity
- John Foster  
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- Bruce Lindholm  
SDDOT Local Programs
- Ben Orsbon  
SDDOT Office of the Secretary
- Raymond Roggow  
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- Hal Rumpca  
SDDOT Research
- Ken Skorseth  
Local Transportation Assistance Program
- Ken Swedeen  
Dakota Asphalt Paving Assn.
- Yvonne Taylor  
SD Municipal League
- Todd Thompson  
SDDOT Bridge Design
- Jeff Des Lauriers  
City of Sioux Falls
- Bob Wilcox  
SD County Commissioners Assn.
- Dale Tech  
SD Street Superintendents Assn.

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49

## 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

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50

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## Questions?

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51