Members

Rep. Edmond Soliday, Chairperson
Rep. Michael Speedy
Rep. William Davis
Rep. Jud McMillin
Rep. Wendy McNamara
Rep. Robert Morris
Rep. Thomas Saunders
Rep. David Yarde
Rep. Nancy Dembowski
Rep. Edward DeLaney
Rep. Phil Pflum
Rep. Steven Stemler
Rep. Dennis Tyler
Sen. Thomas Wyss
Sen. James Merritt
Sen. James Banks
Sen. Vaneta Becker
Sen. Ronald Grooms
Sen. Allen Paul
Sen. James Smith
Sen. James Arnold
Sen. Timothy Lanane
Sen. Earline Rogers

JOINT STUDY COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE ASSESSMENT AND SOLUTIONS

Legislative Services Agency
200 West Washington Street, Suite 301
Indianapolis, Indiana 46204-2789
Tel: (317) 233-0696 Fax: (317) 232-2554

LSA Staff:

Sarah Freeman, Attorney for the Joint Study Committee
Camille Tesch, Fiscal Analyst for the Joint Study Committee
Karen Firestone, Fiscal Analyst for the Joint Study Committee

Authority: P.L. 5-2011

MEETING MINUTES[1]

Meeting Date:	**September 6, 2011**
Meeting Time:	**10:00 A.M.**
Meeting Place:	**State House, 200 W. Washington St., House Chamber**
Meeting City:	**Indianapolis, Indiana**
Meeting Number:	**2**

Members Present: **Rep. Edmond Soliday, Chairperson; Rep. Michael Speedy; Rep. William Davis; Rep. Jud McMillin; Rep. Wendy McNamara; Rep. Robert Morris; Rep. Thomas Saunders; Rep. Nancy Dembowski; Rep. Edward DeLaney; Rep. Phil Pflum; Rep. Steven Stemler; Sen. Thomas Wyss; Sen. James Merritt; Sen. Vaneta Becker; Sen. Ronald Grooms; Sen. James Smith; Sen. James Arnold.**

Members Absent: **Rep. David Yarde; Rep. Dennis Tyler; Sen. James Banks; Sen. Allen Paul; Sen. Timothy Lanane; Sen. Earline Rogers.**

---

[1] These minutes, exhibits, and other materials referenced in the minutes can be viewed electronically at http://www.in.gov/legislative Hard copies can be obtained in the Legislative Information Center in Room 230 of the State House in Indianapolis, Indiana. Requests for hard copies may be mailed to the Legislative Information Center, Legislative Services Agency, West Washington Street, Indianapolis, IN 46204-2789. A fee of $0.15 per page and mailing costs will be charged for hard copies.

I. Call to Order

Chairman Soliday called the meeting to order at 10:05 a.m. and reminded members to review the meeting minutes in preparation for adopting the final report at the September 20 meeting. Chairman Soliday also distinguished between state and local roads and funding, noting that state roads are in better shape due largely to the infusion of funds from Major Moves. Chairman Soliday reminded the Committee of its current focus, defining the transportation infrastructure problems facing Indiana.

II. Congressman Larry Bucshon, 8th Congressional District of Indiana

Congressman Bucshon, who serves on the United States House Transportation and Infrastructure Committee ("Transportation Committee"), spoke about the transportation reauthorization bills currently under consideration by Congress. Following eight short term extensions, the current surface transportation bill is set to expire at the end of September 2011. Congressman Bucshon stated that the surface transportation bill proposed by Congressman John Mica, chairman of the Transportation Committee, provides $34 to $35 billion in annual funding, which keeps the highway transportation fund solvent. Congressman Bucshon said that the highway transportation fund will be insolvent by 2013 if spending continues at current levels. He stated that Chairman Mica's proposed bill alleviates gaps in funding and reduces funded programs from 100 to 25. Congressman Bucshon also criticized environmental regulations as hindering the timely completion of federal transportation projects and expressed his preference for streamlining the process and giving states greater freedom in spending highway transportation funds.

Senator Wyss asked Congressman Bucshon when he expects the proposed funding cuts to affect Indiana and for his opinion on President Obama's infrastructure plans. Congressman Bucshon answered that, due to differences in the transportation bills proposed by the U.S. House and Senate, he is unable to predict what will happen but he would like to see a six year extension. He stated that the President has consistently identified a need for more infrastructure funding but has not designated a funding source.

Representative Delaney asked if Indiana would face a transportation funding cut of one-third under Chairman Mica's bill. Congressman Bucshon confirmed the amount but noted that no agreement has been reached. Chairman Soliday noted that Indiana faces an actual 17% funding decrease even if current levels are maintained, due to inflation, increased material costs, and the absence of federal stimulus dollars.

III. John Haberman, Local Technical Assistance Program (LTAP) Manager, Purdue University School of Civil Engineering

Mr. Haberman presented an assessment of transportation at the county, city, and town levels. See Exhibit A. He compared fuel prices and revenue from 2000 through 2010. Mr. Haberman discussed local bridges and culverts, focusing on bridge inspection standards and schedules and sufficiency ratings. He stated that a bridge is a structure with a span of more than twenty feet; Representative Davis clarified that the proper measurement is the span of the bridge opening. Mr. Haberman said that bridges are inspected every two years using national bridge inspection standards. Senator Wyss asked if structures measuring less than twenty feet are inspected according to uniform standards and schedules. John Ayers (see item V below) answered that counties inspect these structures on their own schedule and with their own standards, which are typically modeled on the standards set forth by the National Safety Transportation Board.

Mr. Haberman provided photographic examples of bridges of various lengths and

sufficiency ratings and described the difference between bridges that are structurally deficient versus functionally obsolete. He also showed pictures of highway pavement with various levels of deterioration, demonstrating the application of the PASER surface rating system. Mr. Haberman presented a chart showing that the cost of repairing or rebuilding a local highway has doubled from 2001 to 2008. Senator Becker clarified that these costs are for local, but not state, highways. Chairman Soliday noted that state highways are in better condition due to repairs funded through Major Moves. Mr. Haberman also distributed copies of LTAP's 2009 needs assessment for local roads and streets as well as the results of an informal electronic survey of local transportation officials of the major transportation related challenges (other than funding) facing them. See Exhibit B. Chairman Soliday again encouraged members to read the LTAP report.

IV. Emily Otto-Tice, Director of Grain Marketing, Indiana Soybean Alliance and Indiana Corn Marketing Council

Ms. Otto-Tice gave each member a folder containing stakeholder information tailored to the member's district. She presented an in-depth analysis of the infrastructure and economic impacts relative to grain movements, biofuels, livestock, and agricultural and food processing in Carroll, Clinton, Jasper, Montgomery, Tippecanoe, and White counties. See Exhibit C. Her presentation included visual representations of rail infrastructure and road adequacy in these counties. Ms. Otto-Tice stated that bridges are the weakest infrastructure link in the counties, with 92 bridges in the counties rated structurally deficient and 65 bridges rated functionally obsolete. Ms. Otto-Tice also provided data showing the economic impact of infrastructure barriers, such as local detours to grain elevators.

Senator Wyss asked to what extent farmers pay fuel taxes. Ms. Otto-Tice stated that fuel used in field equipment is exempt from taxation and that the exempt fuel is dyed to prevent fraud. Representatives Pflum and Saunders then discussed the circumstances under which a farmer operating a motor vehicle or a farm implement would be liable for paying various fuel taxes.

V. John Ayers, Hendricks County Highway Supervisor; President, Indiana Association of County Highway Engineers and Supervisors

Senator Wyss and Mr. Ayers discussed the standards and schedules that counties use when inspecting bridges with a span less than twenty feet. Mr. Ayers testified that Hendricks County inspects these bridges every five years, using standards promulgated by the National Transportation Safety Board. Mr. Ayers stated that Hendricks County contains 220 bridges and over 800 miles of roads serving a population of approximately 140,000. He said that the county's motor vehicle highway (MVH) account revenue is the lowest since 2002 and that the cost of paving supplies has increased twelve percent in recent years, resulting in a 25 to 27 year repaving cycle. Mr. Ayers talked about the various funding sources for bridge and road projects, including cumulative bridge and federal aid funds and revenue from various local option taxes. He stated that Hendricks County's entire $2.9 million paving budget comes from the wheel tax.

Representative Delaney asked for examples of operational costs; Mr. Ayers replied that they are primarily maintenance costs, such as ditch work, patching, plowing, and salting. Representative Davis asked how local governments control the types of vehicles allowed on their roads. Mr. Ayers answered that some counties impose seasonal or permanent weight limits on bridges. Representative Dembowski asked for examples of safety related costs, and Mr. Ayers cited reconfiguring intersections, maintaining or improving signage, and installing guard rails. Chairman Soliday recessed the committee for lunch.

VI. Jack Basso, Director of Management and Business Development, American Association of State Highway Transportation Officials (AASHTO)

Chairman Soliday reconvened the committee at 1:24 p.m. Mr. Basso testified that the financial backbone of the federal highway and transit programs is in critical condition and that the programs are operating on a short-term extension. See Exhibit D. He stated that Congress needs to extend the current funding program to be able to collect revenue and pay the states. Mr. Basso presented a timeline of the steps Congress has taken to keep the federal highway trust fund solvent. He also presented charts showing estimates of federal highway and transit obligations through 2017. Mr. Basso stated that current transportation funding is one-third of what is needed to maintain and improve the current system and that the United States faces a $400 billion transportation funding gap over the next six years. He suggested alternative revenue sources, including user fees and taxes, bonding and credit programs, and public-private partnerships.

Senator Wyss asked Mr. Basso to comment on President Obama's recent remarks about infrastructure. Mr. Basso said he anticipates an announcement of highway and transit projects but not high speed rail or a national infrastructure bank. Representative Davis asked how much of the federal highway transportation fund goes to the Federal Highway Administration (FHWA). Mr. Basso replied that the FHWA receives approximately $350 million annually. Chairman Soliday and Mr. Basso discussed the United States' position relative to other countries when considering the percentage of gross domestic product reinvested in infrastructure.

VII. Tom Murtaugh, Tippecanoe County Commissioner

Mr. Murtaugh stated that Tippecanoe County has a population of 173,000 and 852 road miles, 25% of which are gravel. He said that the county uses its transportation funding to promote economic development and safety, and he fears that local industry may relocate to other states due to the looming funding shortfall. He said that Tippecanoe County's distributions from the MVH and local road and streets (LRS) accounts have decreased by 28% over the last five years and are expected to decrease by an additional six percent in 2012. Mr. Murtaugh also stated that the county's ten year road and bridge plans remain unfunded and that 80% of the calls he receives as a commissioner are road related.

VIII. Rhonda Cook, Director of Government Affairs and Legislative Counsel, Indiana Association of Cities and Towns; Tom DeGiulio, Munster Town Manager

Ms. Cook and Mr. Degiulio identified the following transportation challenges facing cities and towns:

- Decreased road and street funding.
- Increased costs for materials, labor, and equipment.
- Increased number of roads to maintain.
- Need for new infrastructure and transit in addition maintaining existing infrastructure.

See Exhibit E. They also identified the following decisions made at the state level that they contend have limited the ability of local governments to help themselves:

- Diversion of MVH and LRS funding to the Indiana State Police and the Bureau of Motor Vehicles.
- Imposition of property tax caps.
- Specifying permissible uses of MVH and LRS funding.
- Requiring local governments to subsidize the state for street sweeping of state highways.

In response to a question from Chairman Soliday, Mr. DeGiulio confirmed that Lake County has not imposed local wheel or income taxes that would provide additional transportation funding.

IX. Paul Chase, State Director for Public Policy, Indiana AARP; Bernie Arseneau, Deputy Commissioner and Chief Engineer, Minnesota Department of Transportation

Mr. Chase spoke about the Indiana Complete Streets initiative and introduced Mr. Arseneau. See Exhibit F. Mr. Arseneau explained that complete streets are designed and operated to enable safe access for users of all ages and abilities and listed several benefits associated with complete streets:

- Improved safety, mobility, and access.
- Improved public and environmental health.
- Decreased congestion.
- Increased consumer savings and economic activity.

See Exhibit G.

Mr. Arseneau stated that the U.S. Department of Transportation issued complete streets guidance policies in 2000 and 2010. He then described the process by which Minnesota implemented its complete streets policies, which culminated in the passage of complete streets legislation in 2010. Mr. Arseneau displayed photographic comparisons of various complete street roadway conditions. He then described the challenges posed by complete streets policies, including planning and guidance, space allocation, and operations and maintenance. Mr. Arseneau concluded his presentation by describing several complete streets case studies.

X. Jerry Hanas, General Manager, Northern Indiana Commuter Transportation District (NICTD)

Mr. Hanas listed the physical assets of NICTD, including 82 passenger cars, 13 passenger stations, 10 electrical substations, 300 miles of traction power conductors, 100 miles of track and sidings, 35 major bridge structures, and administrative, maintenance, and operations control facilities in Michigan City. See Exhibit H. He stated that NICTD currently operates 41 trains per day on weekdays and 21 trains per day on weekends and holidays, totaling 12,900 scheduled trains per year. Mr. Hanas detailed the improvements made to the South Shore line in recent years, such as enhancing safety by reducing grade crossings and implementing positive train control, improving reliability and capacity, reducing travel time, and providing more frequent service.

Mr. Hanas told Senator Wyss that all calculations in his presentation were based on current dollar values. Representative Delaney asked about the level of cooperation between NICTD and Illinois, and Mr. Hanas characterized the relationship as reasonably good. He told Representative Delaney that legislation would be needed in order for NICTD to operate on the same model as the New York Port Authority. Chairman Soliday encouraged NICTD to continue working to position the Gary airport as a reliever airport for Chicago-O'Hare and Midway.

XI. Gary Langston, President, Indiana Motor Truck Association (IMTA)

Mr. Langston provided written copies of his testimony. See Exhibit I. Mr. Langston described Indiana as a truck friendly environment and commended the creation of the "one stop shop" by the Indiana Department of Revenue, which has resulted in the registration of nearly 250,000 motor trucks in Indiana, generating $90 million in annual revenue. Mr. Langston stated that the IMTA supports public-private partnerships to meet infrastructure

needs, including the lease of the Indiana Toll Road and Major Moves. He said that providing adequate and proportionate transportation funding remains a challenge. Mr. Langston noted that Indiana has the largest disparity between taxes on automobile gasoline ($.018 per gallon) and truck diesel ($0.27 per gallon). Mr. Langston advocated collecting the $0.11 motor carrier fuel surtax at the pump rather than through quarterly payments by carriers.

Chairman Soliday told Mr. Langston it would be helpful if IMTA members would provide information to the Committee to help it define the infrastructure problems facing Indiana now and in the future.

XII. Adjournment

Chairman Soliday reminded members that the third meeting of the committee is scheduled for Tuesday, September 20, 2011. He adjourned the meeting at 3:30 p.m.

County, City, Town Transportation Assessment

John A. Habermann, P.E.
Local Technical Assistance Program
Purdue University School of Civil Engineering

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

TIAS 9/6/2011
Ex. A

Indiana LTAP

The Indiana LTAP Center

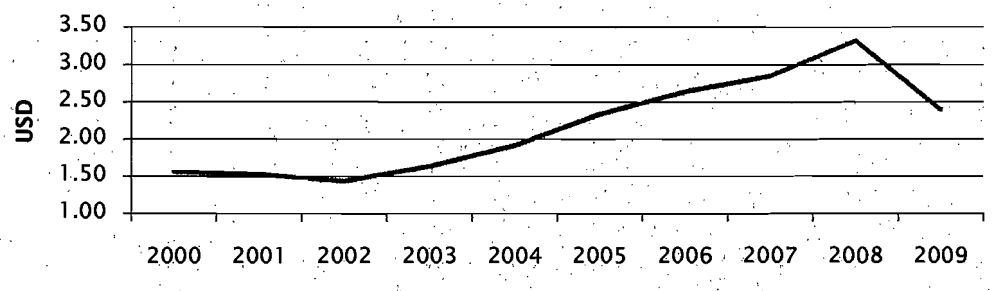
- Enables Indiana Counties, Cities and Towns to improve their transportation network by providing:
  - New and Existing Technology Updates
  - Research and Technical Manuals
  - Training Programs, Workshops and Conferences
  - Informational Clearinghouse
  - Personalized Technical Assistance
  - Newsletters, Directories and Publications
- Indiana LTAP is affiliated with Purdue University and is located in West Lafayette.

Today's Discussion

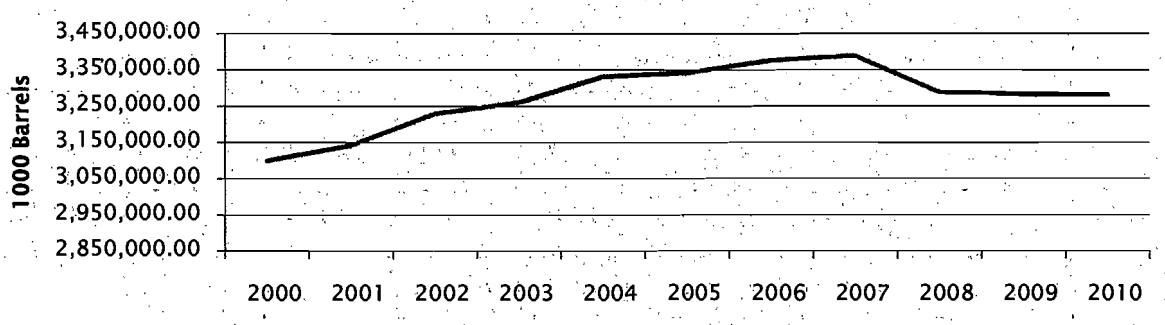
- Why are we here?
- Bridges and Culverts
- Roads and Streets
- 2009 Assessment Report

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

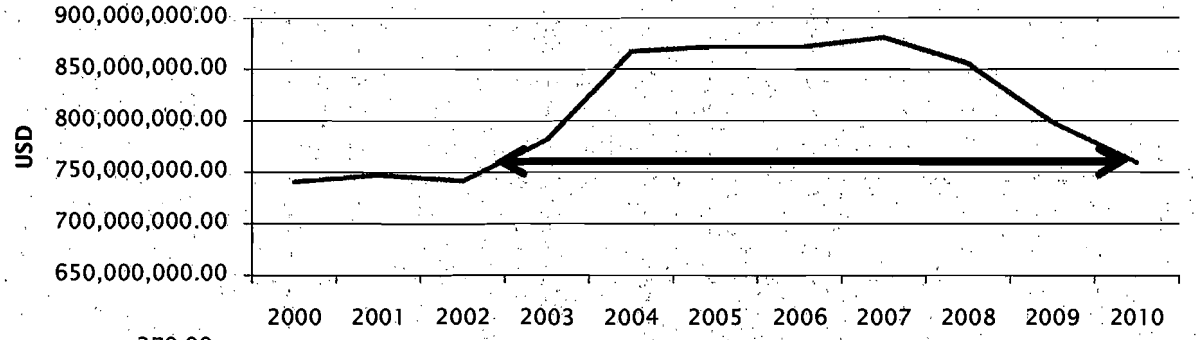
Retail Motor Fuel and Diesel Fuel Prices



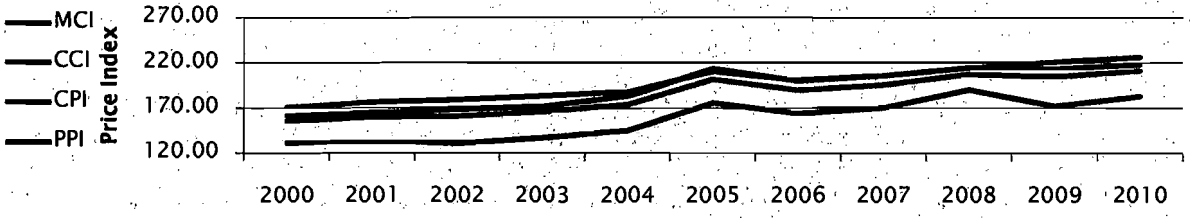
Finished Motor Gas Supplied to U.S. (1000 Barrels)



Total Fuel Revenue



Price Indices per Year



Bridges and Culverts

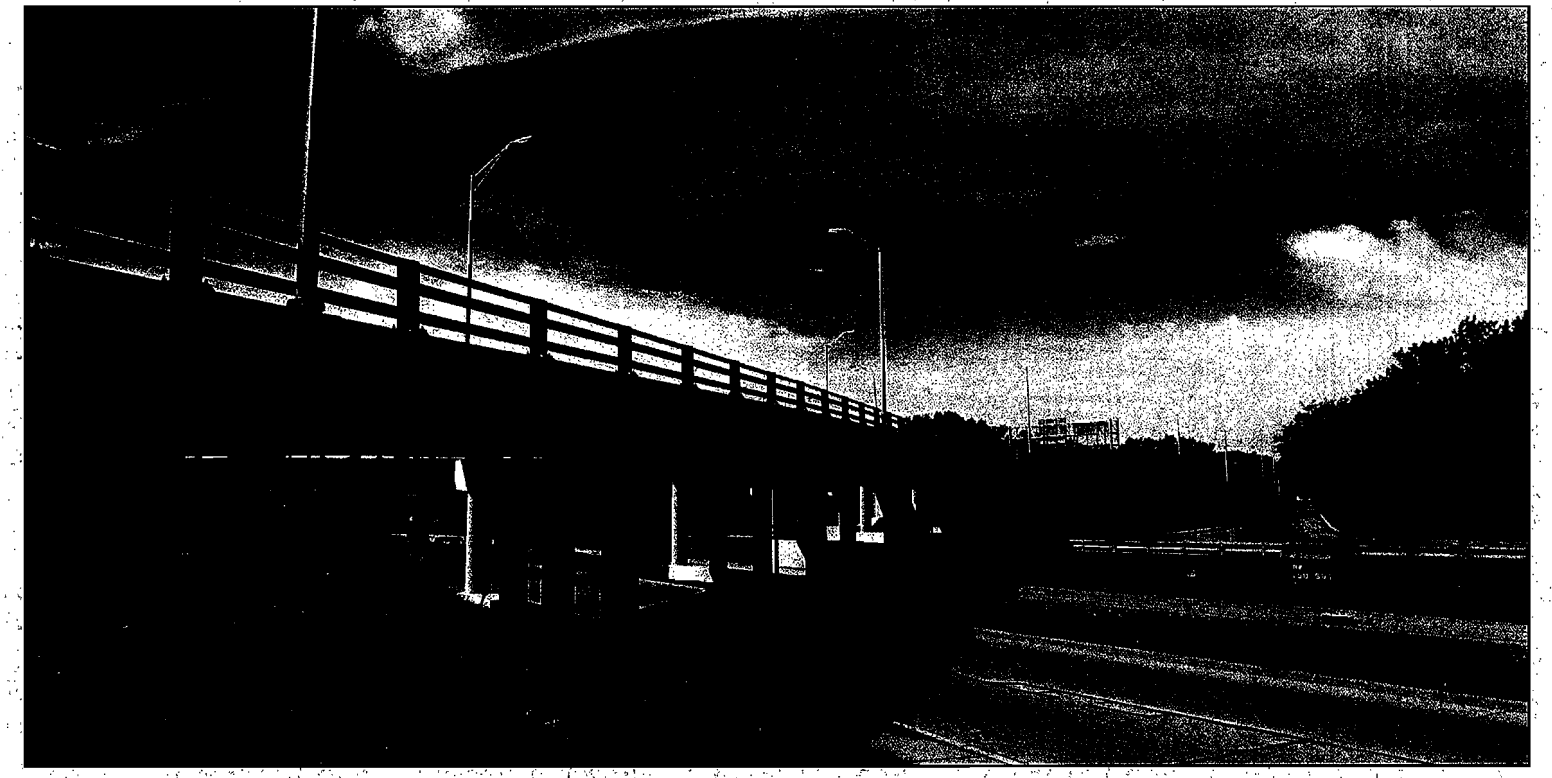
Bridge (National Bridge Inspection Standards)

- What is a Bridge?
- Bridge Sufficiency Rating
- Functionally Obsolete
- Structurally Deficient
- Two year inspection schedule

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

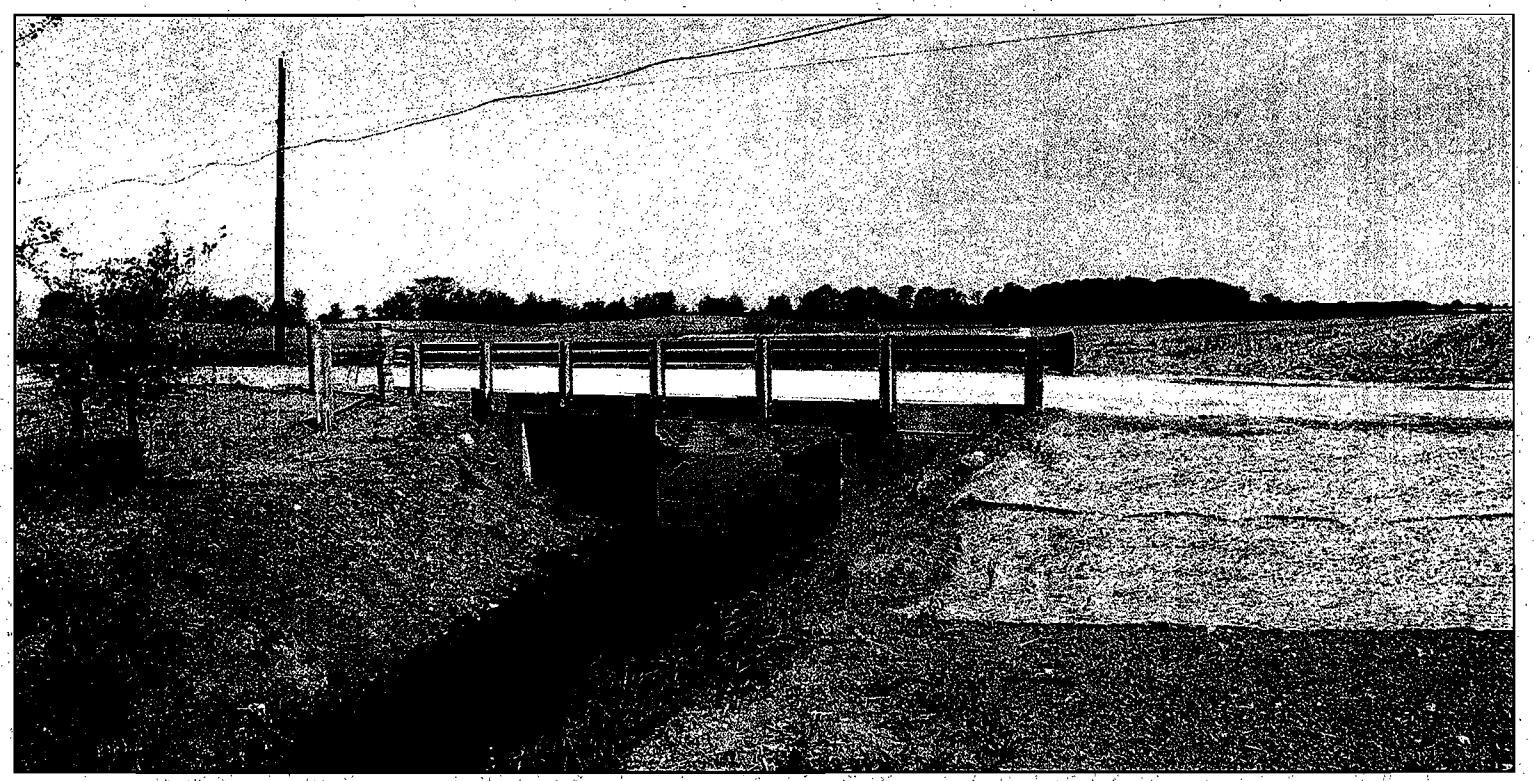
Spans more than twenty feet

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM



Spans more than twenty feet

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

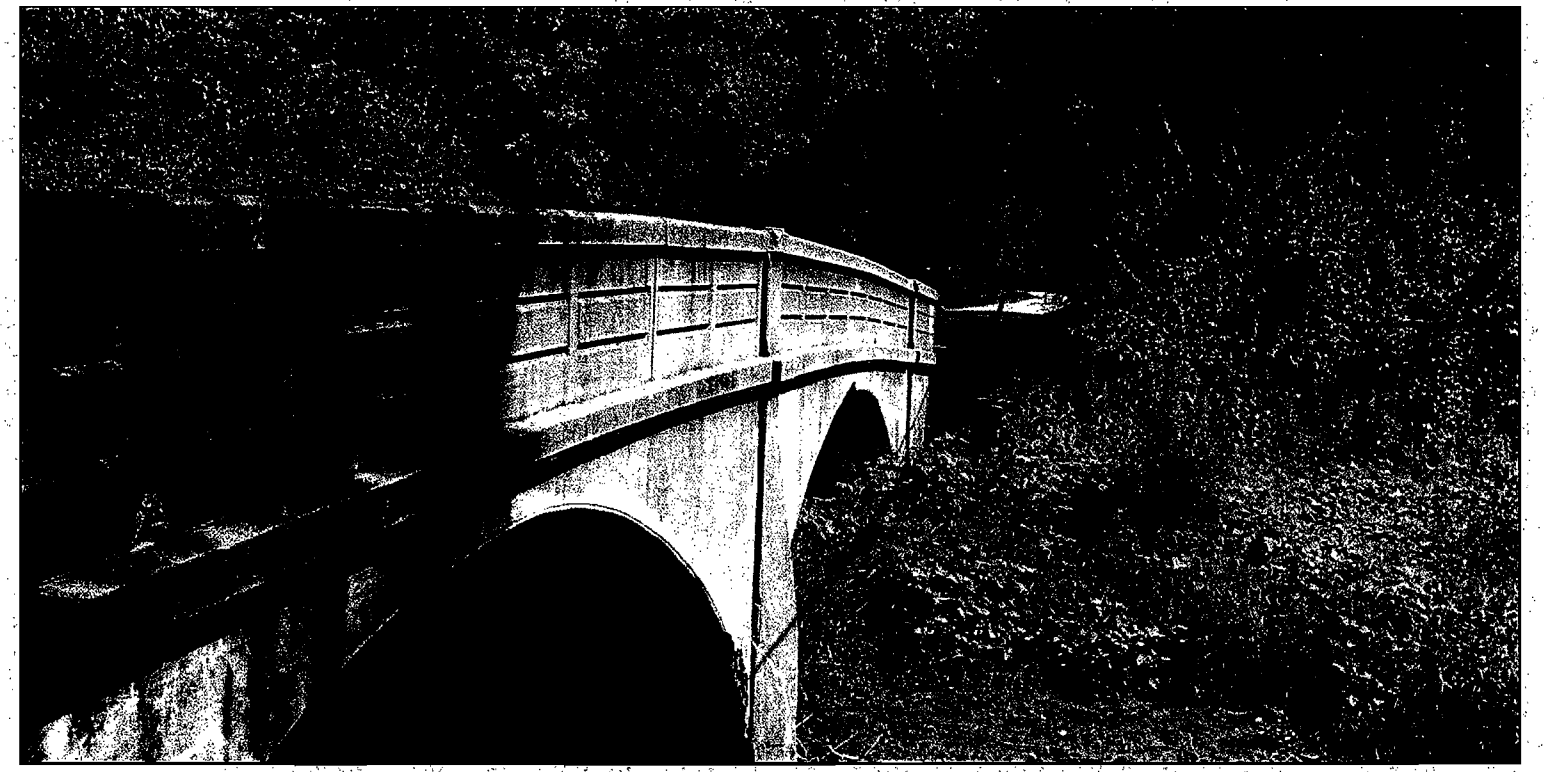


Less than 20 feet

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

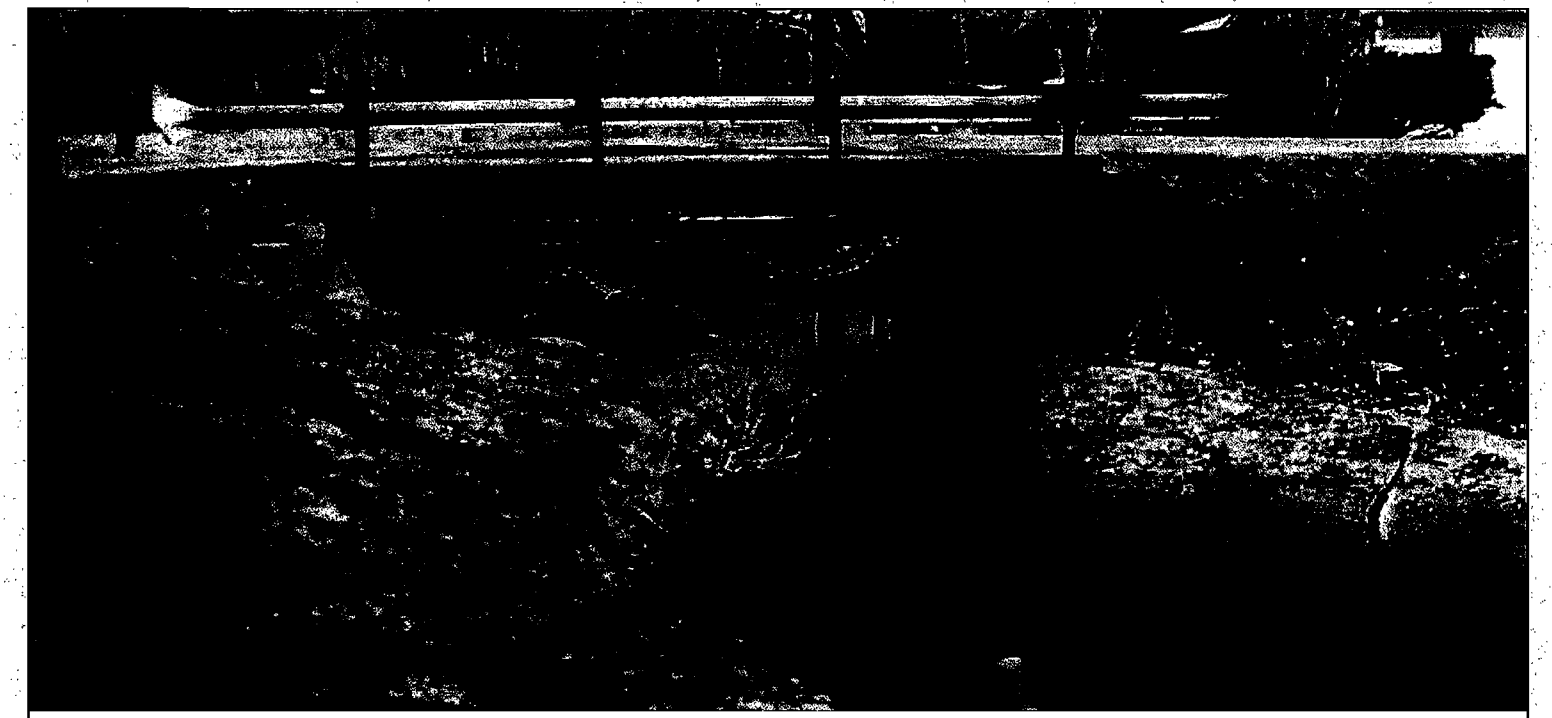
Greater than 90 sufficiency rating

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM



Less than 50 sufficiency rating

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM



Less than 20 feet

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

Functionally obsolete and structurally deficient

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

Functionally obsolete

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

Roads, Streets, and Highways

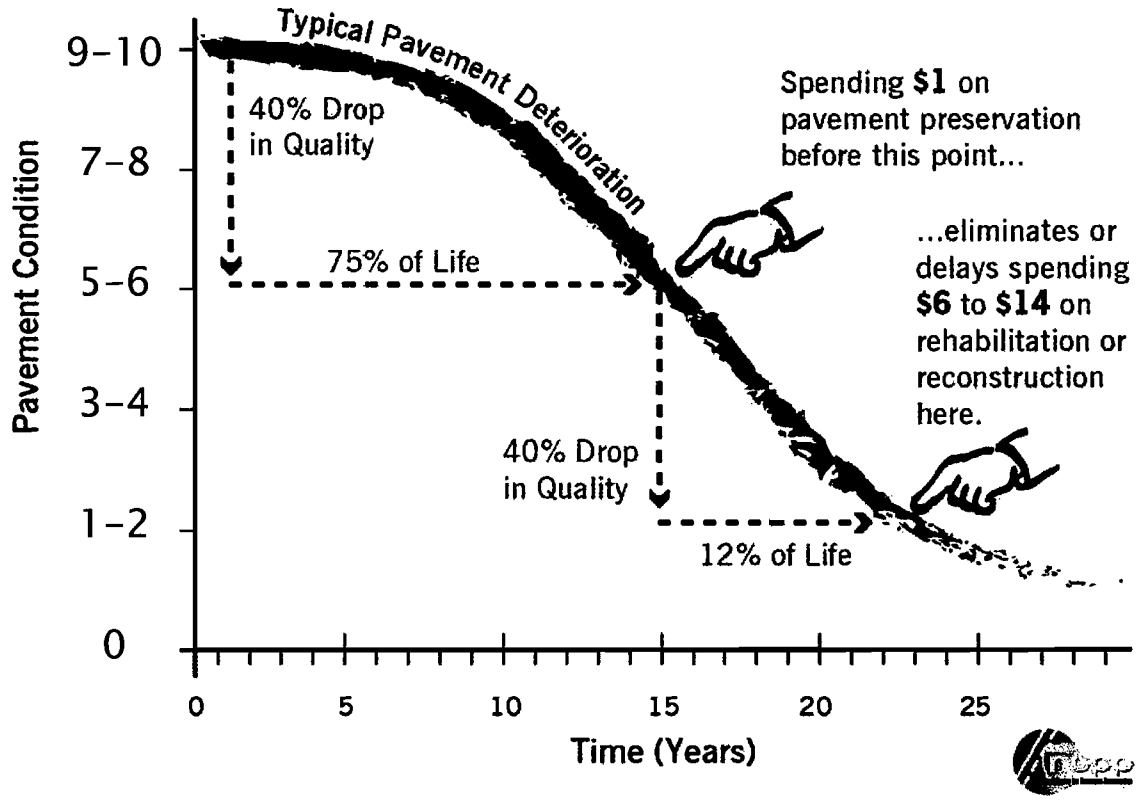
LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

Rating system

Surface rating	*Visible distress**	*General condition/ treatment measures*
10 Excellent	None.	New construction.
9 Excellent	None.	Recent overlay. Like new.
8 Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40' or greater). All cracks sealed or tight (open less than 1/4").	Recent sealcoat or new cold mix. Little or no maintenance required.
7 Good	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open 1/4") due to reflection or paving joints. Transverse cracks (open 1/4") spaced 10' or more apart, little or slight crack raveling. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6 Good	Slight raveling (loss of fines) and traffic wear. Longitudinal cracks (open 1/4"–1/2"), some spaced less than 10'. First sign of block cracking. Sight to moderate flushing or polishing. Occasional patching in good condition.	Shows signs of aging. Sound structural condition. Could extend life with sealcoat.
5 Fair	Moderate to severe raveling (loss of fine and coarse aggregate). Longitudinal and transverse cracks (open 1/2") show first signs of slight raveling and secondary cracks. First signs of longitudinal cracks near pavement edge. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging. Sound structural condition. Needs sealcoat or thin non-structural overlay (less than 2")
4 Fair	Severe surface raveling. Multiple longitudinal and transverse cracking with slight raveling. Longitudinal cracking in wheel path. Block cracking (over 50% of surface). Patching in fair condition. Slight rutting or distortions (1/2" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from a structural overlay (2" or more).
3 Poor	Closely spaced longitudinal and transverse cracks often showing raveling and crack erosion. Severe block cracking. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1" or 2" deep). Occasional potholes.	Needs patching and repair prior to major overlay. Milling and removal of deterioration extends the life of overlay.
2 Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2" deep) Extensive patching in poor condition. Potholes.	Severe deterioration. Needs reconstruction with extensive base repair. Pulverization of old pavement is effective.
1 Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

Pavement Deterioration Curve

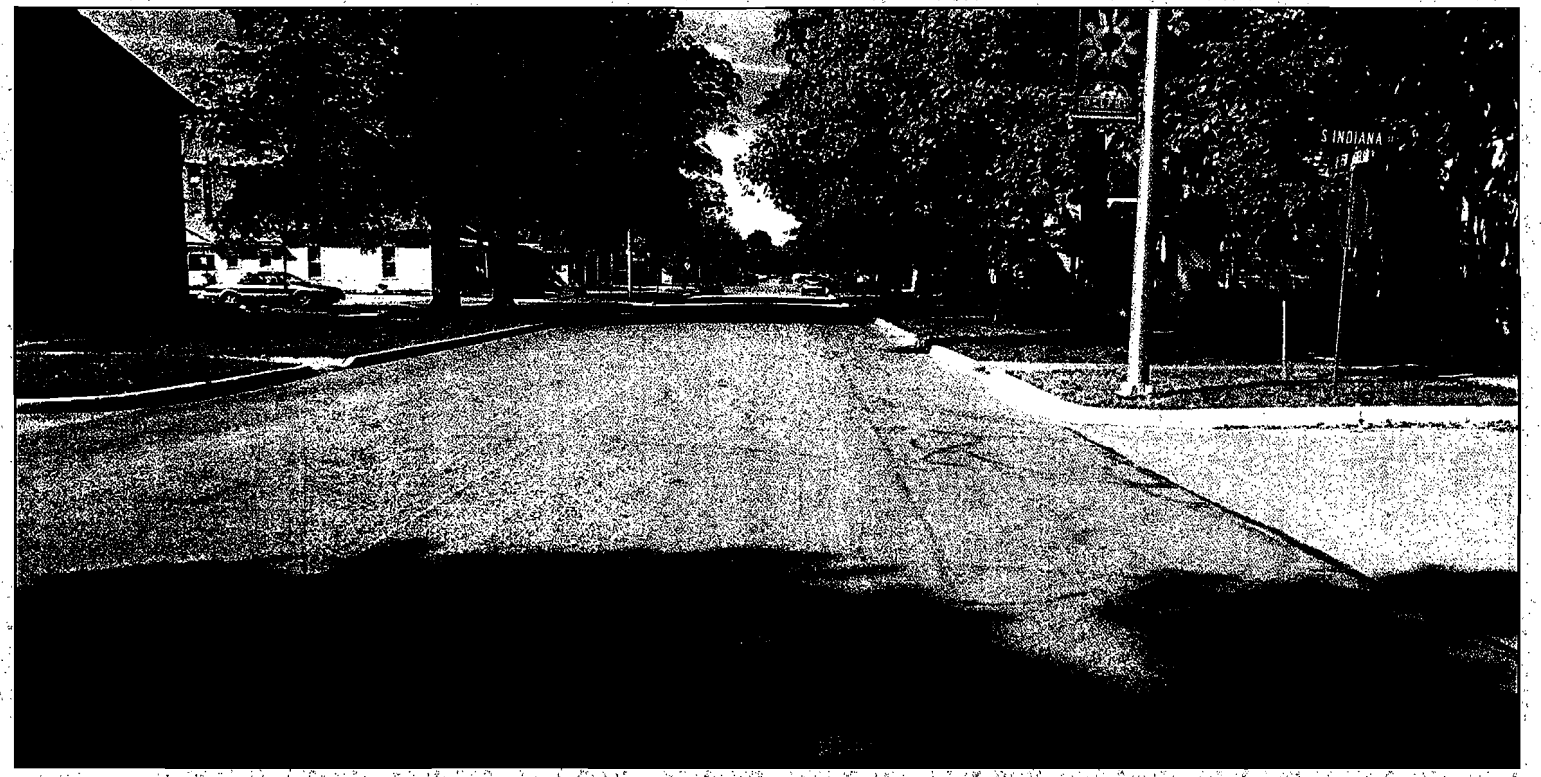
PAVEMENT PRESERVATION IS COST EFFECTIVE



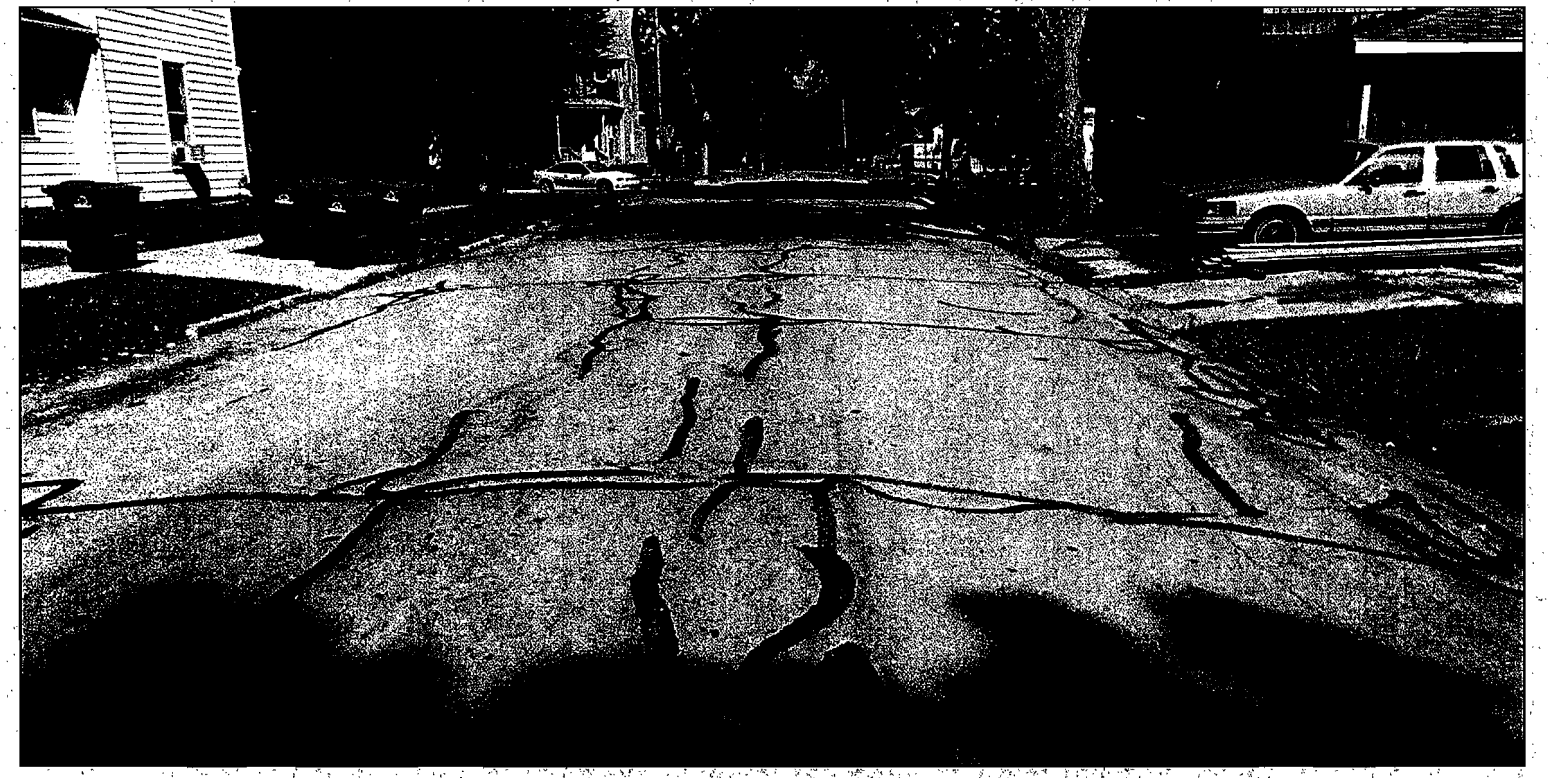
Source: National Center for Pavement Preservation.

PASER 10

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

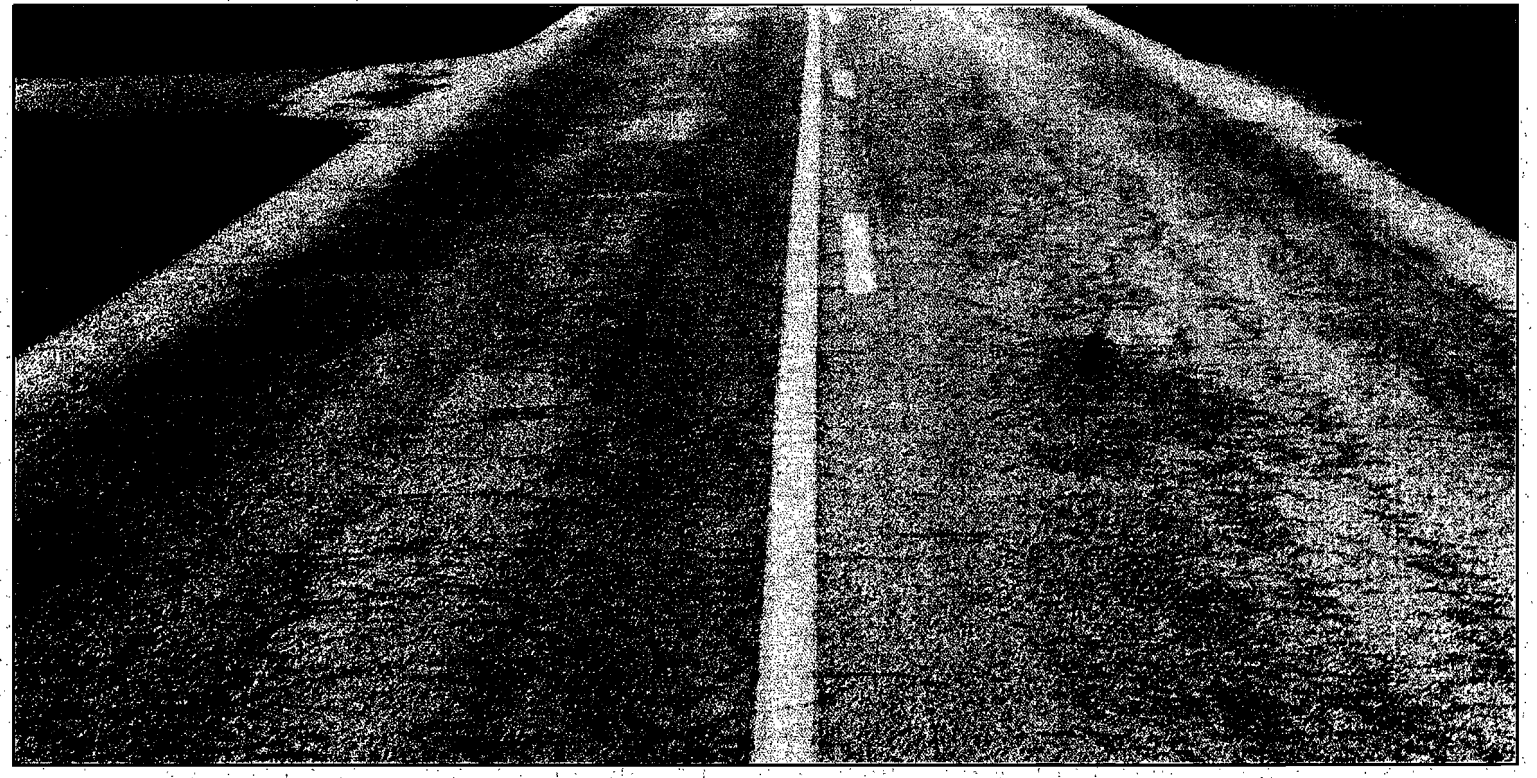


PASER 8



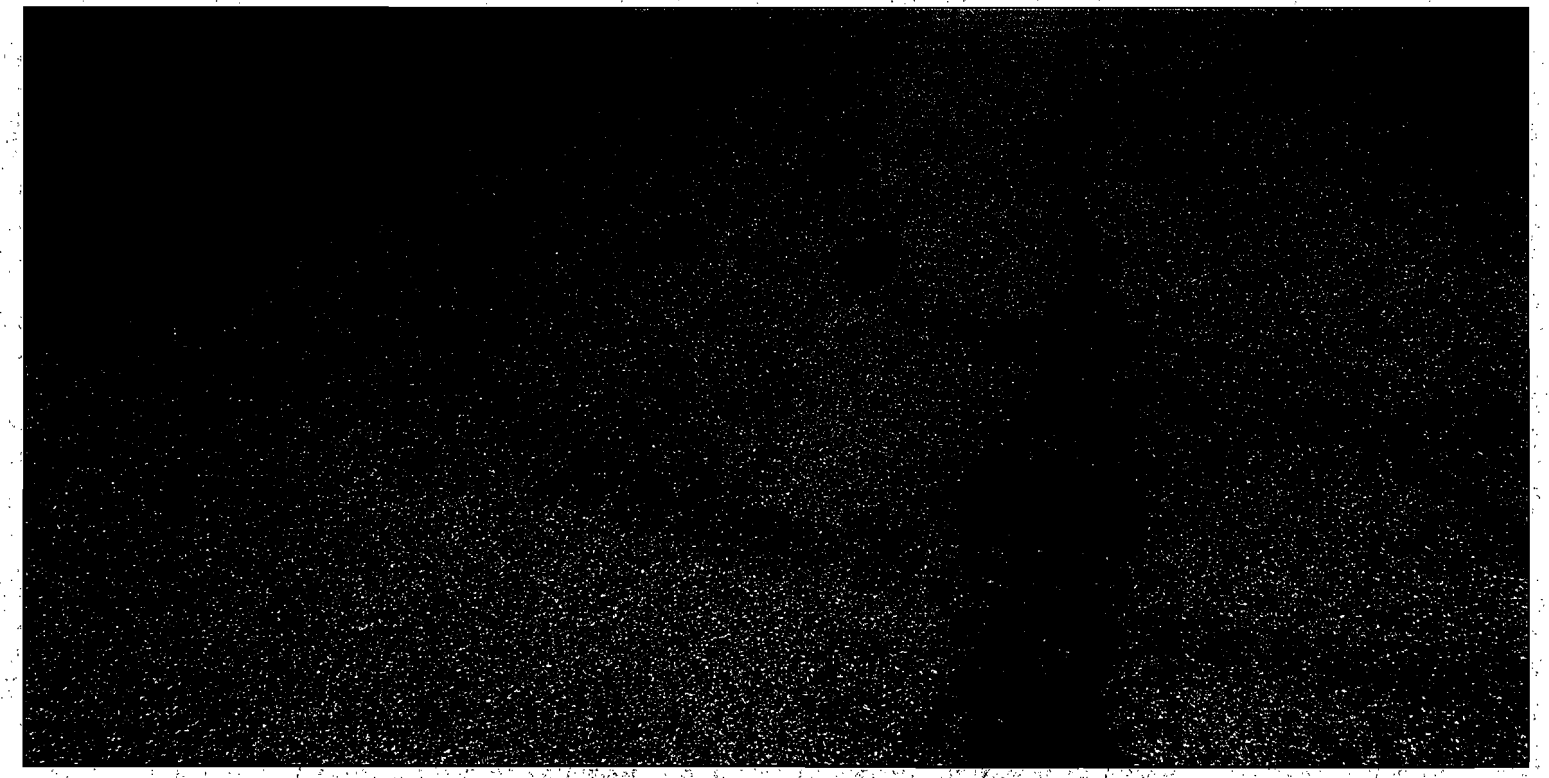
PASER 6

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM



PASER 5

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

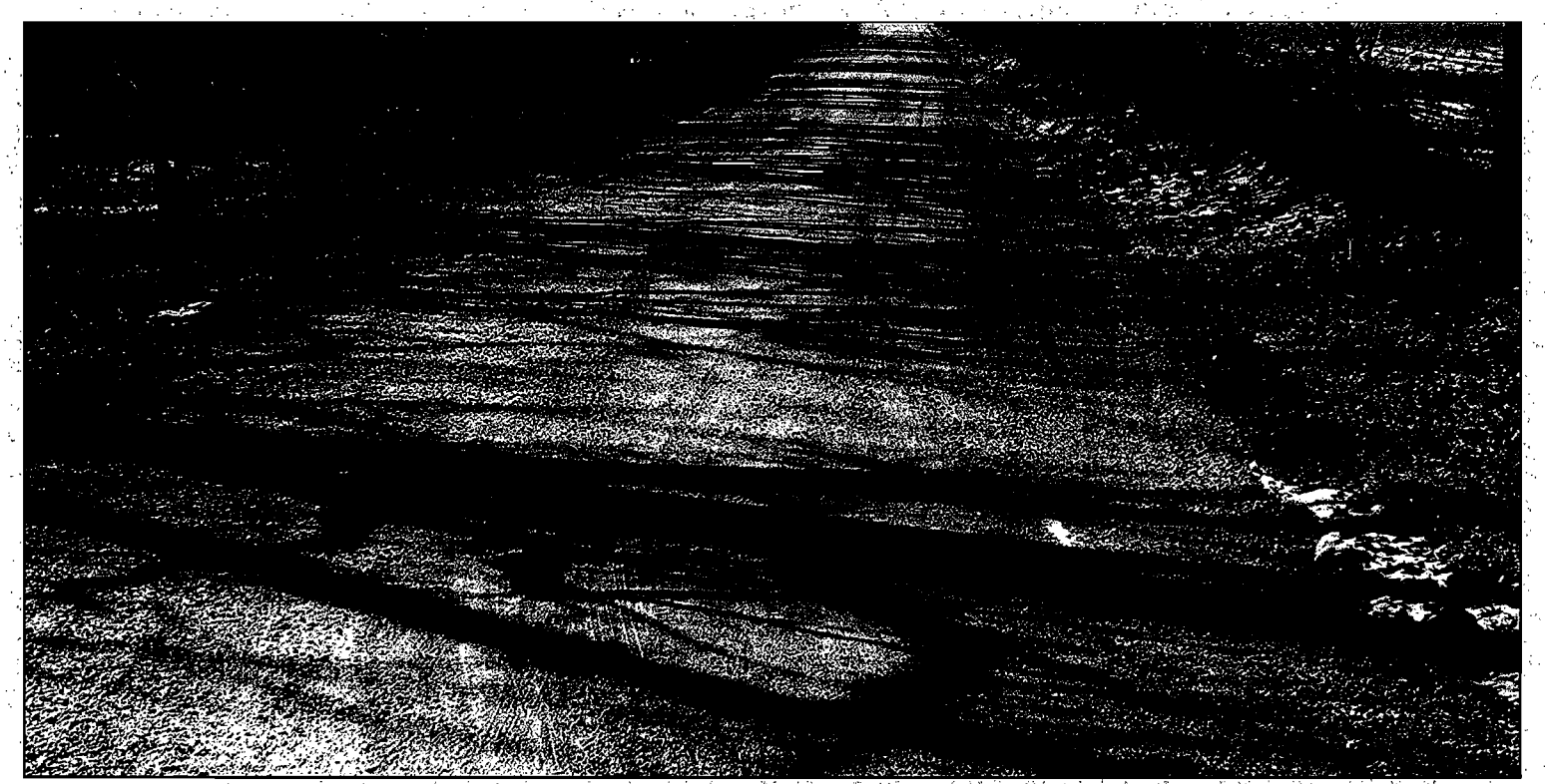


PASER 4

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

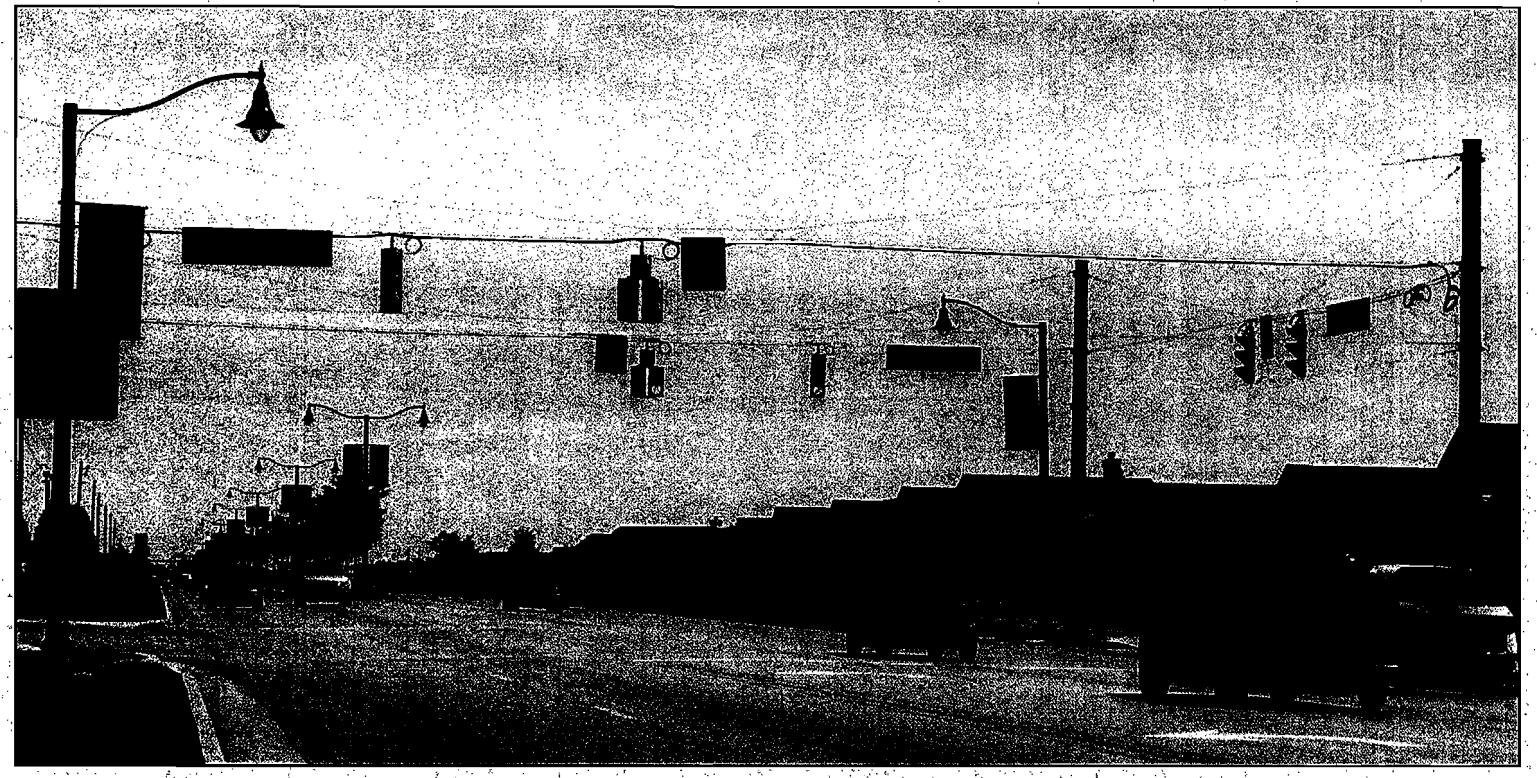
Low volume road is less than 400 vehicles per day

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM



Credit for one mile

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

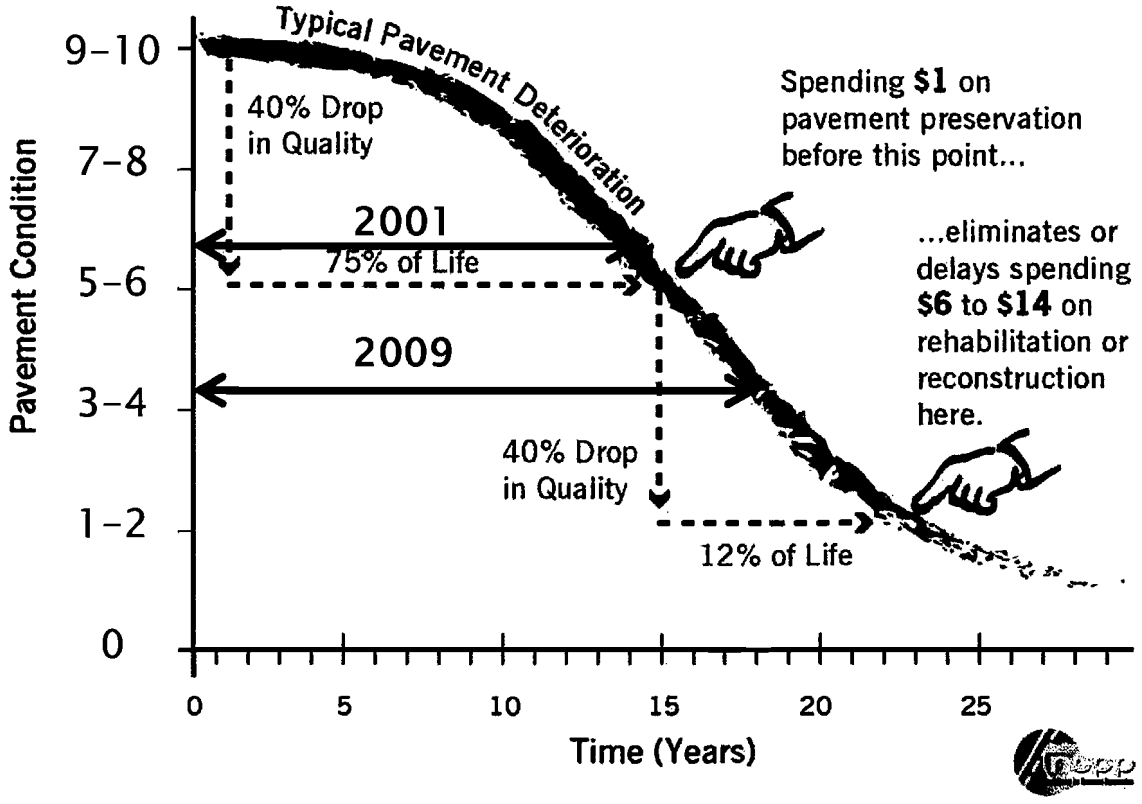


Credit for one mile

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

Pavement Deterioration Curve

PAVEMENT PRESERVATION IS COST EFFECTIVE



Source: National Center for Pavement Preservation.

Comparison (in Millions)

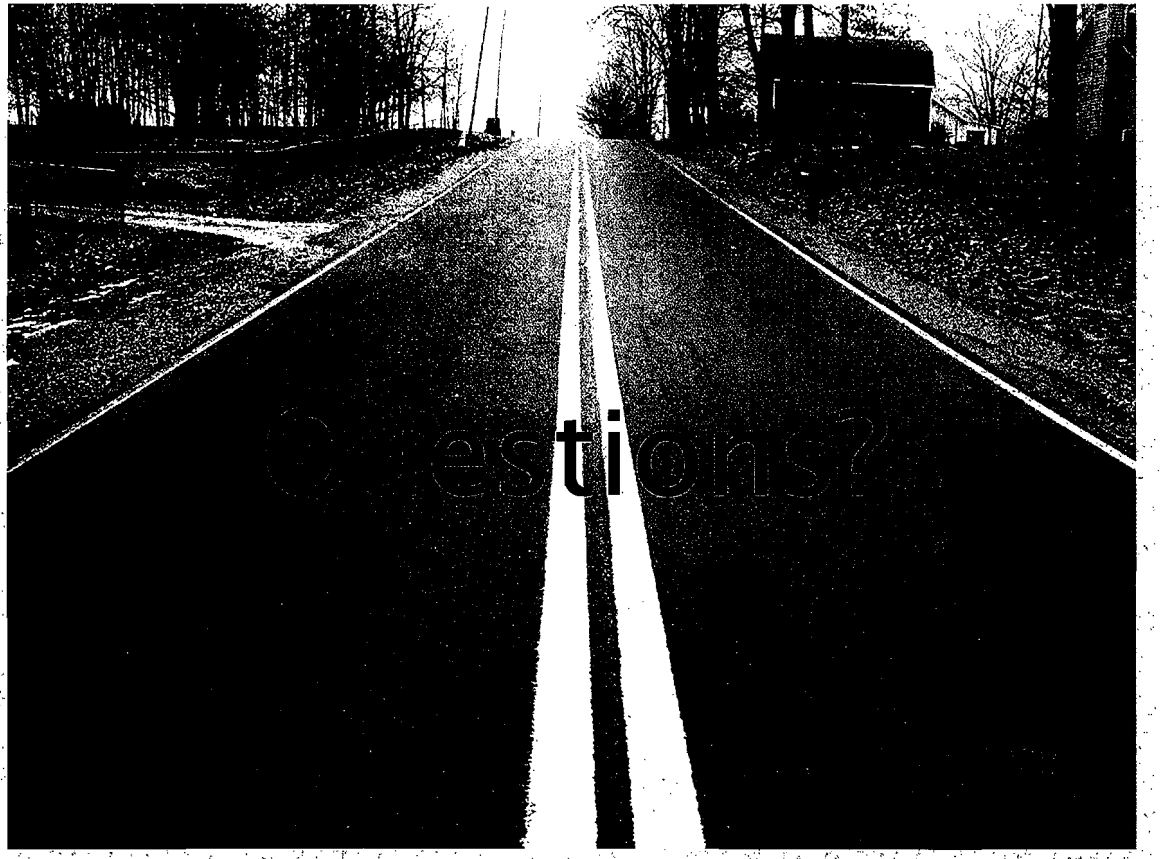
2001

Feature	Short-term	Long-term
Roads & Streets	$985	$307
Bridges & Culverts	$783	$126
Safety Improve-ments	$248	$20
Total	$2,016	$453

2008

Feature	Short-term	Long-term
Roads & Streets	$3,504	$715
Bridges & Culverts	$1,169	$117
Safety Improve-ments	$706	$26
Total	$5,379	$858

LTAP LOCAL TECHNICAL ASSISTANCE PROGRAM



Questions?

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

References

Retail Motor Fuel and Diesel Fuel Prices

US Dept. of Energy Information Administration
www.eia.gov/emeu/aer/txt/ptb0524.html

Finished Motor Gas Supplied to U.S. (1000 Barrels)

US Dept. of Energy Information Administration
www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MGFUPUS1&f=M

Total Fuel Revenue

Indiana Handbook of Taxes, Revenues and Appropriations from the Indiana Legislative Services Agency Office of Fiscal and Management Analysis
http://www.in.gov/legislative/publications/handbook.html

Price Indices per Year

American City and County Cost Index Archives
http://americancityandcounty.com/mciarchive/#Archive

TIAS 9/16/11
Ex. B

LTAP

LOCAL TECHNICAL
ASSISTANCE PROGRAM

1435 Wm Hentschel Blvd., Suite B100,
West Lafayette, Indiana 47906-4150
Phone: 765.494.2164 Fax: 765.496.1176
Toll Free: 800.428.7639
www.purdue.edu/INLTAP

WHO ARE WE...

LTAP is an established nationwide system of technology transfer (T2) centers. Funding for the centers comes from Federal LTAP funds, State departments of transportation, universities, local agencies, and finances designated by State legislation.

WHAT WE DO...

Indiana LTAP provides technical assistance and training to the highway, road and street departments of all 92 counties, 119 cities and approximately 450 towns in Indiana that are responsible for over 80,000 miles of roads and over 12,000 bridges.

The four focus areas of all LTAP Centers as defined by the FHWA are:

- Safety
- Workforce Development
- Infrastructure Management
- Organizational Excellence

We accomplish these by: maintaining a mailing list; publishing a quarterly newsletter; producing and distribute technology transfer materials; maintaining an information service; developing and conducting conferences and workshops and; evaluating the effectiveness of the program

WHO WE SERVE...

Indiana LTAP works hard to serve:

- City & Town Street Departments
- County Highway Departments
- City & County Engineering Departments
- City Mayors & Town Managers
- County Commissioners
- County Surveyors
- MPOs & RPOs
- Police Departments
- Consultants
- Contractors

OUR FRIENDS...

Indiana Association of County Commissioners (IACC), Indiana Association of County Highway Engineers and Supervisors (IACHES), Indiana Street Commissioners Association (ISCA), Indiana Association of City Engineers (IACE), Association of Indiana Counties (AIC), Indiana Association of Cities and Towns (IACT).

OUR SPONSORS...

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

PURDUE UNIVERSITY

SCHOOL OF CIVIL ENGINEERING

INDIANA DEPARTMENT OF TRANSPORTATION INDOT

Needs Assessment for Local Roads and Streets

Executive Summary

April 2009
SP-1a-2009

by

Indiana LTAP Center

Purdue University
1435 Win Hentschel Blvd., Suite B100
West Lafayette, Indiana 47906

Telephone: 765.494.2164
Toll Free in Indiana: 1.800.428.7639
Facsimile: 765.496.1176

This document is disseminated under the sponsorship of the Indiana LTAP Center at Purdue University in the interest of information exchange. Purdue University and the Indiana LTAP Center assume no liability for its contents or use thereof. Purdue University and the Indiana LTAP Center do not endorse products or manufacturers. Trademarks or manufacturers names may appear herein only because they are considered essential to the objective of this document. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policy of Purdue University or the Indiana LTAP Center. This report does not constitute a standard, specification, or regulation.

April 2009

To Whom It May Concern:

Needs Assessment for Local Roads and Streets

Please find attached an updated Needs Assessment for Local Roads and Streets. This report was updated at the request of several members of the Local Technical Assistance Program (LTAP) Advisory Board and industry professionals within Indiana. The objective was to use the condition of local transportation infrastructure to identify the funding levels required to maintain this infrastructure and then compare this with existing funding to determine the adequacy of the current funding.

This updated distribution of the Needs Assessment for Local Roads and Streets comes several years after the first report. This release contains updated information on the current condition and the cost to maintain the local transportation infrastructure, including roads and streets, bridges and culverts, and traffic safety features. This document has been revised to reflect current pavement condition data, as documented by an independent pavement assessment survey in an eight county sample, and current bridge data, as documented by the bridge inventory database.

The basic finding of the study is evidence that there is a severe shortage of funds to adequately maintain local transportation facilities. The shortage has existed for a long enough period of time that there is now a need for short-term funding simply to "catch up". The report estimates the short-term funding required for this "catching up", as well as the long-term funding over and above current funding required to maintain this system. The purpose of this report is not to identify specific sources for local transportation funds, but rather to document and quantify the need.

For questions related to the information included in this report, please contact me at the phone number or address listed below.

Sincerely,

John Habermann, P.E.
Program Manager, Indiana LTAP
1435 Win Hentschel Blvd, Suite B100
West Lafayette, IN 47906-7639
765.494.2164

The full report is available online at:
http://rebar.ecn.purdue.edu/LTAP/Resources/Publications.aspx

1. Executive Summary

The objective of this needs assessment for local roads and streets was to identify the needs of and resources available to local public agencies (LPAs) to construct and maintain their transportation infrastructure. Components of the infrastructure considered in this study include roads and streets, bridges and culverts, and traffic safety features; supporting operational and administrative costs were also considered.

Table 1.1. Transportation Infrastructure Funding Shortfalls for Local Agencies

Component	Short-term (Backlog)	Long-term (Annual)
Roads and Streets	$3,504,000,000	$715,000,000
Bridges and Culverts	$1,169,000,000	$117,000,000
Safety Improvements	$706,000,000	$26,000,000
Total	$5,379,000,000	$858,000,000

The results of the study indicate that there is a significant shortfall in funding in all of these areas. Table 1.1 shows the increased funding necessary, over and above existing funding, for each of the main study areas. The study includes two funding components. The first component is the short-term funding to remediate the deficiencies of the current system. This short-term funding would be used to address the backlog that has resulted from years of inadequate funding. The short-term funding could be distributed over a period of five to ten years; however, no provision for the impact of inflation is reflected in this value. The second component is the long-term need, which represents the annual funding shortfall. The long-term shortfall is the difference between the funding required for annual maintenance and programmed reconstruction of the current system and the funding currently provided. The long-term shortfall is expressed in current dollars, and does not reflect future inflation.

Securing funding to meet the short-term and long-term needs will ensure that adequate resources are available to maintain and reconstruct the existing transportation infrastructure, and protect this investment. The funding identified is based on actual costs and conditions in Indiana. Information from many sources was used to develop these estimates, including the Indiana Department of Transportation (INDOT) Highway and Street Inventory, County Highway Operational Reports, a condition survey of county roads, Federal Highway Administration (FHWA) reports and Indiana Local Technical Assistance Program (LTAP) publications. Funding estimates for roads and streets are based on the findings of a condition survey of over 3,100 miles of paved county roads in eight counties. The survey data, which was provided by an independent consultant in 2008, is extrapolated to estimate the pavement needs for all local agencies in the state. Funding estimates for bridges are based on the National Bridge Inspection Standard (NBIS) bridge database. Funding estimates for safety improvements are based on the survey of county roads (for widening and lane markings) and on previous LTAP research (for traffic signs).

1.1. Significant Findings

The significant findings of this study are presented below and address the funding shortfall for local agencies, with specific findings regarding local roads and streets, bridges and culverts, and traffic and safety.

1.1.1. Funding Shortfall

- The short-term funding shortfall for local agencies is currently estimated to be $5.4 billion. This represents the backlog of needs that have accumulated, as facilities have deteriorated over time.
- The long-term funding shortfall for local agencies is currently estimated to be $858 million. This represents the additional funding that is needed each year in order to preserve the existing transportation system on the proposed maintenance and reconstruction schedule.
- Local agencies described the funding situation as critical in the October 23, 2008 Commission on Tax and Finance Policy Hearing, citing the dual challenges of steep cost increases (e.g., salt) and fluctuating costs (e.g., asphalt, fuel and aggregate).
- Funding has not kept pace with increasing expenses, and funding revenues for local agencies have been reduced by increased expenses for both the Net State Police Expense and the Bureau of Motor Vehicles Expense, which come directly from the Motor Vehicle Highway (MVH) funds. The Net State Police Expense has increased substantially, consuming over $86 million in fiscal year (FY) 07-08, compared to $53 million in FY 04-05 (a 62 percent increase). The Bureau of Motor Vehicles expense has also increased substantially, consuming $50 million in FY 07-08, compared to under $39 million in FY 05-06 (a 29 percent increase).
- Funding revenues for local agencies have also diminished due to the reduction in gas tax revenues associated with a decline in vehicle miles traveled and an increase in fuel efficiency. Projections from the Indiana Auditor of State in December 2008 predict decreasing funds for both the MVH and Local Road and Street (LRS) funds. Local agencies may be faced with 2009 revenues that are 5 percent below 2008 revenues (Indiana Auditor of State, 2008), which were 5 percent below 2007 revenues (Davis, 2009).
- Considering MVH and LRS distributions to locals, revenues in FY 07-08 were 17 percent below revenues in FY 99-00, although costs have increased approximately 29 percent between 1999 and 2008 (Bureau of Labor Statistics, *CPI Inflation Calculator*); adjusting for inflation, funding in FY 07–08 is 36 percent lower than the funding in FY 99-00.

1.1.2. Roads and Streets

- County highway and city and town street departments maintain over 84,000 miles of roads and streets. This local system accounts for nearly 90 percent of all of the public roads in Indiana.
- An assessment of funding indicates that the MVH distributions to county highway and local street departments are consumed by administrative, operating, and other necessary expenses. LRS funds are used almost exclusively to maintain local roads. The majority

of counties and many municipalities utilize supplemental funds for transportation, although supplemental funding is inadequate to address the bulk of the transportation funding needs.

- An in-depth evaluation of county roads illustrates the challenges faced by local agencies. An independent consultant was hired to provide assessment of over 3,100 miles of Indiana's paved county roads. This assessment provides clear evidence that local roads need to be improved.
  - Over half of the paved county roads are recommended for improvement, based on the PASER rating. The PASER rating is determined by a visual assessment of pavement condition, based on cracking, rutting and other visible signs of deterioration. A PASER rating of four or less indicates that the pavement is significantly compromised and improvement is needed. Based on the PASER assessment, 51 percent of the paved county roads have a rating of four or less.
  - The international roughness index (IRI) was also used to assess the condition of county roads. The IRI was developed to provide an objective measure of road smoothness, and is recognized as a standard by the World Bank. Seventy-seven percent of county roads exceed an IRI of 125 inches/mile, a traditional breakpoint for a smooth pavement. Only 19 percent of state roads have an IRI greater than 125 inches/mile, indicating that county roads are much rougher. The IRI assessment also confirms that approximately half of the paved county roads need improvement; 46 percent of the paved county roads surveyed have an IRI greater than 200 inches/mile and are recommended for improvement.
- Cities and towns face the same constraints that counties do in terms of limited funding and increasing costs. The cost of maintaining all local roads has continued to increase while the funding available through MVH and LRS has not increased accordingly.

1.1.3. Bridges and Culverts

- County agencies maintain 12,836 bridges over 20 feet in length and an estimated 260,000 smaller bridges and culverts.
- Twenty-five percent of Indiana's county bridges over 20 feet are either structurally deficient or functionally obsolete.
- More than 9 percent of county bridges over 20 feet are load posted below 15 tons, which restricts the average sized school bus from crossing, and necessitates a detour.
- Bridge funding among Indiana counties varies significantly between counties, from as low as $839 to as high as $15,857 per year per bridge over 20 feet. This wide range illustrates one of the limitations of the cumulative bridge fund, a primary source of bridge funding. Bridge funding of over $11,000 per year per bridge over 20 feet is required to meet the proposed bridge replacement program (for an average size bridge).

1.1.4. Traffic and Safety

- Annual travel on county roads is estimated at 19 billion annual vehicle miles, according to the Federal Highway Administration (FHWA); travel on city and town streets is estimated at 15 billion annual vehicle miles. Local roads play an important role in statewide mobility, and serve approximately 46 percent of the total miles traveled in Indiana (Drumm, 2009).
- Traffic safety is lower on local roads and streets than on state maintained routes. FHWA safety records indicate that 59 percent of all crashes from 2003 to 2006 (the most recent data available) occurred on locally maintained routes, despite their lower traffic volume. The injury crash rate on local roads is more than twice the injury crash rate on state roads, and approximately 46 percent of all fatal crashes occur on local roads (Drumm, 2009).
- Legible traffic signs provide information necessary for the safe and efficient operation of the road system. A survey of signs in Indiana indicates that 245,000 signs on local roads (including counties, cities and towns) are in poor condition and should be replaced.
- Lane delineation plays an important role in road safety. However, 88 percent of the paved county roads included in the condition survey did not have edgeline markings and 72 percent did not have centerline markings. These findings are considered representative of all county roads in the state, although not representative of the conditions in cities and towns.
- Adequate lane width is an important factor contributing to safety; however, the survey of paved county roads indicates that over half (53 percent) of the roads surveyed are less than 18 feet, the minimum width recommended by the American Association of State Highway and Transportation Officials (AASHTO, 2004). These findings are considered representative of all county roads in the state, although not representative of the conditions in cities and towns.

The provision of an adequate, stable and predictable funding source for local roads and bridges is necessary to maintain the integrity of our transportation network, and to ensure the mobility and safety necessary to supports the economic needs of the many jurisdictions in our state. This report documents the increasing needs and the decreasing revenues that face local agencies, and highlights the negative consequences that have resulted from a lack of adequate funding in the last decade. The transportation funding shortfall has resulted in deteriorating conditions, and is evidenced by the $5.4 billion funding needed to improve facilities that have deteriorated. To maintain our local road infrastructure, a dedicated source of $858 million per year in additional funding should be allocated. The estimated funding requirements reflect maintenance of the existing system; they do not reflect additional capacity which may be needed to meet future demand or serve future facilities.

The full report is available online at:
http://rebar.ecn.purdue.edu/LTAP/Resources/Publications.aspx

INDIANA Local Technical Assistance Program

Needs Assessment for Local Roads and Streets

April 2009

SP-1a-2009

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

PURDUE UNIVERSITY
SCHOOL OF CIVIL ENGINEERING

1435 Win Hentschel Blvd., Suite B100, West Lafayette, Indiana 47905-4150
765.494.2164 or 800.428.7639 toll free in Indiana

Needs Assessment for Local Roads and Streets

April 2009
SP-1a-2009

by

Indiana LTAP Center

Purdue University
1435 Win Hentschel Blvd., Suite B100
West Lafayette, Indiana 47906

Telephone: 765.494.2164
Toll Free in Indiana: 1.800.428.7639
Facsimile: 765.496.1176

This document is disseminated under the sponsorship of the Indiana LTAP Center at Purdue University in the interest of information exchange. Purdue University and the Indiana LTAP Center assume no liability for its contents or use thereof. Purdue University and the Indiana LTAP Center do not endorse products or manufacturers. Trademarks or manufacturers names may appear herein only because they are considered essential to the objective of this document. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policy of Purdue University or the Indiana LTAP Center. This report does not constitute a standard, specification, or regulation.

April 2009

To Whom It May Concern:

Needs Assessment for Local Roads and Streets

Please find attached an updated Needs Assessment for Local Roads and Streets. This report was updated at the request of several members of the Local Technical Assistance Program (LTAP) Advisory Board and industry professionals within Indiana. The objective was to use the condition of local transportation infrastructure to identify the funding levels required to maintain this infrastructure and then compare this with existing funding to determine the adequacy of the current funding.

This updated distribution of the Needs Assessment for Local Roads and Streets comes several years after the first report. This release contains updated information on the current condition and the cost to maintain the local transportation infrastructure, including roads and streets, bridges and culverts, and traffic safety features. This document has been revised to reflect current pavement condition data, as documented by an independent pavement assessment survey in an eight county sample, and current bridge data, as documented by the bridge inventory database.

The basic finding of the study is evidence that there is a severe shortage of funds to adequately maintain local transportation facilities. The shortage has existed for a long enough period of time that there is now a need for short-term funding simply to "catch up". The report estimates the short-term funding required for this "catching up", as well as the long-term funding over and above current funding required to maintain this system. The purpose of this report is not to identify specific sources for local transportation funds, but rather to document and quantify the need.

For questions related to the information included in this report, please contact me at the phone number or address listed below.

Sincerely,

John Habermann, P.E.
Program Manager, Indiana LTAP
1435 Win Hentschel Blvd, Suite B100
West Lafayette, IN 47906-7639
765.494.2164

Acknowledgements

This research was conducted with the support of the Indiana Association of County Commissioners, the Association of Indiana Counties, and the Build Indiana Council, and under the guidance of the LTAP Technical Advisory Committee.

Table of Contents

Page

1 Executive Summary 1
  1.1 Significant Findings 2

2 Background and Introduction 5

3 Information and Inventory Data of Existing Infrastructure 6
  3.1 Roads and Streets 6
  3.2 Bridges and Culverts 6
  3.3 Traffic and Safety 7

4 Condition Assessment of Exiting Infrastructure 10
  4.1 Survey of Pavement Condition of County Roads 10
  4.2 Bridge Conditions 17
  4.3 Traffic Safety 20

5 Funding Needs and Capabilities 28
  5.1 Available Funding Sources 28
  5.2 Estimated Funding Required 41
  5.3 Shortfall of Current Funding 48

6 Summary and Conclusion 52
  6.1 Roads and Streets 52
  6.2 Bridges and Culverts 53
  6.3 Traffic Safety 53
  6.4 Conclusion 53

References 55

Appendix A. Illustrated Examples of County Road Conditions 58

Appendix B. Illustrated Examples of PASER Ratings 67

Appendix C. Enhancing Safety on Local Roads 79

Appendix D. Glossary of Terms and Acronyms 85

Appendix E. Case Studies 87

List of Figures

		Page
Figure 4.1	Sample of Eight Counties Included in Road Condition Survey	11
Figure 4.2	Survey Vehicle Used to Collect Pavement Data	13
Figure 4.3	Road User Costs Increase with Increased Road Roughness	17
Figure 4.4	Comparison of Deficient Bridges in Indiana and Adjacent States	19
Figure 4.5	2007 County Bridge Eligibility for Replacement Using Federal Aid	21
Figure 4.6	Illustration of Sign Visibility on Local Roads in Indiana	22
Figure 5.1.	Indiana Transportation Funding (FY 08, all $ in Millions)	29
Figure 5.2	Trends in Funding and Price Indices	50

List of Tables

		Page
Table 1.1	Transportation Infrastructure Funding Shortfalls for Local Agencies	1
Table 3.1	Local Road and Street Inventory	6
Table 3.2	Bridge and Culvert Inventory	7
Table 4.1	County Data for Sample Counties	12
Table 4.2	Summary of Road Condition Rating Results	14
Table 4.3	Summary of Road Condition Roughness Results	14
Table 4.4	Road Assessment Metrics	14
Table 4.5	Road Condition Survey Results by County	15
Table 4.6	IRI Guidelines by Road Type	16
Table 4.7	State and County Bridge Conditions	19
Table 4.8	Results of Survey of Local Traffic Signs	23
Table 4.9	Results of Survey of Pavement Markings	23
Table 4.10	Results of Survey of Road Width	24
Table 4.11	Safety Statistics for Eight County Sample	25
Table 4.12	Safety Statistics for Indiana	25
Table 4.13	Crash Data for Eight County Sample	27
Table 5.1	MVH Fund Revenues, Last Ten Years	30
Table 5.2	MVH Fund Expenses, Last Ten Years	31
Table 5.3	MVH Fund Distributions, Last Ten Years	32
Table 5.4	Administrative and Operational Expenses (MVH Funds)	33
Table 5.5	LRS Fund Revenues, Last Ten Years	33
Table 5.6	LRS Fund Distributions, Last Ten Years	34
Table 5.7	Supplemental Funding for Counties (CY 2006)	34
Table 5.8	Supplemental Funds for Sample Counties (CY 2006)	36
Table 5.9	Supplemental Funds for All Counties (CY 2006)	37
Table 5.10	Supplemental Funds for Cities and Towns over 20,000 (CY 2006)	38
Table 5.11	Cumulative Bridge Funding for Selected Counties (CY 2007)	40
Table 5.12	County Road Maintenance Funding Requirements	43
Table 5.13.	Bridge and Culvert Funding Requirements	46
Table 5.14	Short-term Funding Needed to Meet Sign Standards for Local Governments	47
Table 5.15	Long-term Funding Shortfall for Roads and Streets	49
Table 5.16	Long-term Funding Shortfall for Bridges and Culverts	49
Table 6.1	Transportation Infrastructure Funding Shortfalls	52

1. Executive Summary

The objective of this needs assessment for local roads and streets was to identify the needs of and resources available to local public agencies (LPAs) to construct and maintain their transportation infrastructure. Components of the infrastructure considered in this study include roads and streets, bridges and culverts, and traffic safety features; supporting operational and administrative costs were also considered.

Table 1.1. Transportation Infrastructure Funding Shortfalls for Local Agencies

Component	Short-term (Backlog)	Long-term (Annual)
Roads and Streets	$3,504,000,000	$715,000,000
Bridges and Culverts	$1,169,000,000	$117,000,000
Safety Improvements	$706,000,000	$26,000,000
Total	$5,379,000,000	$858,000,000

The results of the study indicate that there is a significant shortfall in funding in all of these areas. Table 1.1 shows the increased funding necessary, over and above existing funding, for each of the main study areas. The study includes two funding components. The first component is the short-term funding to remediate the deficiencies of the current system. This short-term funding would be used to address the backlog that has resulted from years of inadequate funding. The short-term funding could be distributed over a period of five to ten years; however, no provision for the impact of inflation is reflected in this value. The second component is the long-term need, which represents the annual funding shortfall. The long-term shortfall is the difference between the funding required for annual maintenance and programmed reconstruction of the current system and the funding currently provided. The long-term shortfall is expressed in current dollars, and does not reflect future inflation.

Securing funding to meet the short-term and long-term needs will ensure that adequate resources are available to maintain and reconstruct the existing transportation infrastructure, and protect this investment. The funding identified is based on actual costs and conditions in Indiana. Information from many sources was used to develop these estimates, including the Indiana Department of Transportation (INDOT) Highway and Street Inventory, County Highway Operational Reports, a condition survey of county roads, Federal Highway Administration (FHWA) reports and Indiana Local Technical Assistance Program (LTAP) publications. Funding estimates for roads and streets are based on the findings of a condition survey of over 3,100 miles of paved county roads in eight counties. The survey data, which was provided by an independent consultant in 2008, is extrapolated to estimate the pavement needs for all local agencies in the state. Funding estimates for bridges are based on the National Bridge Inspection Standard (NBIS) bridge database. Funding estimates for safety improvements are based on the survey of county roads (for widening and lane markings) and on previous LTAP research (for traffic signs).

1.1. Significant Findings

The significant findings of this study are presented below and address the funding shortfall for local agencies, with specific findings regarding local roads and streets, bridges and culverts, and traffic and safety.

1.1.1. Funding Shortfall

- The short-term funding shortfall for local agencies is currently estimated to be $5.4 billion. This represents the backlog of needs that have accumulated, as facilities have deteriorated over time.
- The long-term funding shortfall for local agencies is currently estimated to be $858 million. This represents the additional funding that is needed each year in order to preserve the existing transportation system on the proposed maintenance and reconstruction schedule.
- Local agencies described the funding situation as critical in the October 23, 2008 Commission on Tax and Finance Policy Hearing, citing the dual challenges of steep cost increases (e.g., salt) and fluctuating costs (e.g., asphalt, fuel and aggregate).
- Funding has not kept pace with increasing expenses, and funding revenues for local agencies have been reduced by increased expenses for both the Net State Police Expense and the Bureau of Motor Vehicles Expense, which come directly from the Motor Vehicle Highway (MVH) funds. The Net State Police Expense has increased substantially, consuming over $86 million in fiscal year (FY) 07-08, compared to $53 million in FY 04-05 (a 62 percent increase). The Bureau of Motor Vehicles expense has also increased substantially, consuming $50 million in FY 07-08, compared to under $39 million in FY 05-06 (a 29 percent increase).
- Funding revenues for local agencies have also diminished due to the reduction in gas tax revenues associated with a decline in vehicle miles traveled and an increase in fuel efficiency. Projections from the Indiana Auditor of State in December 2008 predict decreasing funds for both the MVH and Local Road and Street (LRS) funds. Local agencies may be faced with 2009 revenues that are 5 percent below 2008 revenues (Indiana Auditor of State, 2008), which were 5 percent below 2007 revenues (Davis, 2009).
- Considering MVH and LRS distributions to locals, revenues in FY 07-08 were 17 percent below revenues in FY 99-00, although costs have increased approximately 29 percent between 1999 and 2008 (Bureau of Labor Statistics, *CPI Inflation Calculator*); adjusting for inflation, funding in FY 07–08 is 36 percent lower than the funding in FY 99-00.

1.1.2. Roads and Streets

- County highway and city and town street departments maintain over 84,000 miles of roads and streets. This local system accounts for nearly 90 percent of all of the public roads in Indiana.

- An assessment of funding indicates that the MVH distributions to county highway and local street departments are consumed by administrative, operating, and other necessary expenses. LRS funds are used almost exclusively to maintain local roads. The majority of counties and many municipalities utilize supplemental funds for transportation, although supplemental funding is inadequate to address the bulk of the transportation funding needs.
- An in-depth evaluation of county roads illustrates the challenges faced by local agencies. An independent consultant was hired to provide assessment of over 3,100 miles of Indiana's paved county roads. This assessment provides clear evidence that local roads need to be improved.
  - Over half of the paved county roads are recommended for improvement, based on the PASER rating. The PASER rating is determined by a visual assessment of pavement condition, based on cracking, rutting and other visible signs of deterioration. A PASER rating of four or less indicates that the pavement is significantly compromised and improvement is needed. Based on the PASER assessment, 51 percent of the paved county roads have a rating of four or less.
  - The international roughness index (IRI) was also used to assess the condition of county roads. The IRI was developed to provide an objective measure of road smoothness, and is recognized as a standard by the World Bank. Seventy-seven percent of county roads exceed an IRI of 125 inches/mile, a traditional breakpoint for a smooth pavement. Only 19 percent of state roads have an IRI greater than 125 inches/mile, indicating that county roads are much rougher. The IRI assessment also confirms that approximately half of the paved county roads need improvement; 46 percent of the paved county roads surveyed have an IRI greater than 200 inches/mile and are recommended for improvement.
- Cities and towns face the same constraints that counties do in terms of limited funding and increasing costs. The cost of maintaining all local roads has continued to increase while the funding available through MVH and LRS has not increased accordingly.

1.1.3. Bridges and Culverts

- County agencies maintain 12,836 bridges over 20 feet in length and an estimated 260,000 smaller bridges and culverts.
- Twenty-five percent of Indiana's county bridges over 20 feet are either structurally deficient or functionally obsolete.
- More than 9 percent of county bridges over 20 feet are load posted below 15 tons, which restricts the average sized school bus from crossing, and necessitates a detour.
- Bridge funding among Indiana counties varies significantly between counties, from as low as $839 to as high as $15,857 per year per bridge over 20 feet. This wide range illustrates one of the limitations of the cumulative bridge fund, a primary source of bridge funding. Bridge funding of over $11,000 per year per bridge over 20 feet is required to meet the proposed bridge replacement program (for an average size bridge).

1.1.4. Traffic and Safety

- Annual travel on county roads is estimated at 19 billion annual vehicle miles, according to the Federal Highway Administration (FHWA); travel on city and town streets is estimated at 15 billion annual vehicle miles. Local roads play an important role in statewide mobility, and serve approximately 46 percent of the total miles traveled in Indiana (Drumm, 2009).
- Traffic safety is lower on local roads and streets than on state maintained routes. FHWA safety records indicate that 59 percent of all crashes from 2003 to 2006 (the most recent data available) occurred on locally maintained routes, despite their lower traffic volume. The injury crash rate on local roads is more than twice the injury crash rate on state roads, and approximately 46 percent of all fatal crashes occur on local roads (Drumm, 2009).
- Legible traffic signs provide information necessary for the safe and efficient operation of the road system. A survey of signs in Indiana indicates that 245,000 signs on local roads (including counties, cities and towns) are in poor condition and should be replaced.
- Lane delineation plays an important role in road safety. However, 88 percent of the paved county roads included in the condition survey did not have edgeline markings and 72 percent did not have centerline markings. These findings are considered representative of all county roads in the state, although not representative of the conditions in cities and towns.
- Adequate lane width is an important factor contributing to safety; however, the survey of paved county roads indicates that over half (53 percent) of the roads surveyed are less than 18 feet, the minimum width recommended by the American Association of State Highway and Transportation Officials (AASHTO, 2004). These findings are considered representative of all county roads in the state, although not representative of the conditions in cities and towns.

The provision of an adequate, stable and predictable funding source for local roads and bridges is necessary to maintain the integrity of our transportation network, and to ensure the mobility and safety necessary to supports the economic needs of the many jurisdictions in our state. This report documents the increasing needs and the decreasing revenues that face local agencies, and highlights the negative consequences that have resulted from a lack of adequate funding in the last decade. The transportation funding shortfall has resulted in deteriorating conditions, and is evidenced by the $5.4 billion funding needed to improve facilities that have deteriorated. To maintain our local road infrastructure, a dedicated source of $858 million per year in additional funding should be allocated. The estimated funding requirements reflect maintenance of the existing system; they do not reflect additional capacity which may be needed to meet future demand or serve future facilities.

2. Background and Introduction

The purpose of this report is to provide current, accurate, and objective information on the condition of the local roads and streets, bridges and culverts, and selected safety features maintained by LPAs. This condition assessment is then used identify the funding needed to address system deficiencies. This report also identifies the funding needed to maintain the transportation system, as well as the current funding available. Based on the needs and the resources available, recommendations are made as to the adequacy of the current funding.

It is commonly believed by local transportation officials that there is inadequate funding to maintain the transportation infrastructure at an acceptable level. Data to support this claim, however, can be difficult to obtain due to the size of the system itself (over 84,000 miles of local roads and streets) and the large number of agencies involved (over 650 local agencies responsible for local roads). Each of these agencies has their own methods of managing these systems, ranging from state-of-the-art to informal. Because there are no statewide reporting requirements, the data collected and how this data is used varies significantly depending on the agency. This makes it difficult to collect data, draw conclusions and make recommendations about the local systems on a statewide basis.

The Indiana LTAP Center has been asked to investigate and report on the current condition of the local transportation infrastructure on a statewide basis. Early in 2000, the Indiana LTAP Advisory Board approved the original project. A report documenting the findings of this project was published in 2001 (Indiana LTAP, 2001). In 2008, the LTAP Advisory Board requested that LTAP revise the study to reflect current conditions and to assess the progress that LPAs have made towards improving the condition of the transportation infrastructure. The Indiana LTAP Center is considered the appropriate agency to conduct this study because of their knowledge of local road and bridge conditions, their relationship with county and city engineers, and related work that the Center is involved. This report is intended to identify the funding needs for all local road and bridge infrastructure, including counties, cities and towns.

3. Information and Inventory Data of Existing Infrastructure

The first step in developing a program for infrastructure improvements is to develop an accurate inventory of the existing system. Accurate road, bridge, and traffic information is essential for local government officials to make informed decisions. Unfortunately, it can also be difficult information to obtain, especially when aggregating data from the local level, when each agency operates independently with its own inventory system.

3.1. Roads and Streets

INDOT maintains a database for local roads; however, it is very difficult to maintain a current and accurate central database for all local roads in Indiana. The only information that is regularly maintained is additions and deductions to each agency's total road and/or street mileage, for purposes of funding distributions. Even this information varies significantly from what the local agencies report on their Annual Operational Reports. Data such as surface types, condition ratings, road and shoulder widths, and traffic volumes are often not included in the data or are out-of-date. Most of the local highway and street departments maintain some or all of the necessary information, but each agency collects and stores information in a different way. This results in a system in which agencies have data that is useful for their own purposes, but the data is difficult to combine with other agencies to create an accurate picture of road conditions statewide.

For purposes of this report, road and street information was based on the INDOT road and street inventory and the Annual Operational Reports completed by all county highway agencies and the street departments of cities and towns with populations greater than 20,000. Table 3.1 lists the mileage for counties, cities and towns per INDOT inventory (INDOT , 2007) and the surface type based on the County Operational Reports (Indiana State Board of Accounts, 2006/2007).

Table 3.1. Local Road and Street Inventory

Agency	Mileage
County Roads	
Paved Roads	49,612 miles
Unpaved Roads	16,537 miles
City and Town Streets	18,133 miles
Total	84,283 miles

Note: The total shown does not equal the sum of the individual values due to rounding.

3.2. Bridges and Culverts

Bridges are an integral part of the transportation infrastructure and in some ways are more critical than the roads themselves. Closed and load restricted bridges are a road block for many vehicles. Residences may be excluded from school buses routes, and farmers may be unable to get grain trucks to market due to weight restricted structures. Narrow bridges pose a similar problem when their width restrictions prevent farm machinery from crossing.

According to the National Bridge Inspection Standard (NBIS), a bridge is defined as a structure greater than 20 feet long that carries public traffic or other moving loads (National Archives and Records Administration, 2009). The NBIS requires a complete bridge inspection every two years and provides a great deal of information on bridge conditions within Indiana and nationwide. Within Indiana, most bridges are maintained by county highway departments. There are 12,836 bridges (70 percent) maintained by county agencies and 5,596 bridges (30 percent) maintained by INDOT. While the number of bridges on the county system is much higher, they are typically smaller structures than those found on the state system. A better measure of responsibility is the total amount of deck area on each system. By that measure, INDOT maintains 48.44 million square feet of bridge deck area (63 percent), while the county agencies maintain 28.04 million square feet (37 percent). The average county bridge is 25 feet wide and 74 feet long, while the average state bridge is 42 feet wide and 187 feet long.

Table 3.2. Bridge and Culvert Inventory

Agency	Number
County Bridges	
Greater than 125 feet	1,549
Less than 125 feet	11,287
Total County Bridge	12,836
County Culverts	
Class 1-Pipes less than 12 square feet	220,000
Class 2-Pipes greater than 12 square feet	40,000
Total County Culverts (estimated)	260,000

As mentioned above, bridges are defined as structures with span lengths of at least 20 feet. Therefore, structures with span lengths less than 20 feet are not included in the NBIS data. NBIS data does not reflect many thousands of small diameter pipes, box culverts, and bridges as long as 19 feet 11 inches. Although these structures are much less expensive to design and install than regular bridges, the large number of these structures produces a burden on agencies that must be considered. Although the specific number and exact cost of culverts is difficult to estimate due to the lack of reliable county inventories, reasonable estimates were developed based on detailed reports from Floyd and Fountain Counties. Culvert sizes range from an 8 inch diameter pipe to a bridge as long as 19 feet 11 inches. To increase the accuracy of cost estimates, culverts in this report have been divided into two classes. Class 1 includes structures with less than 12 square feet opening area (4 feet diameter), Class 2 includes structures with greater than 12 square feet opening area. Table 3.2 provides inventory information on bridges and culverts maintained by Indiana counties.

3.3. Traffic and Safety

It is beyond the scope of this study to inventory all road related safety features, but signage, pavement markings, and adequate lane width are considered among the most critical safety features of any road. An estimate for upgrading signs to current minimum standards was based on the findings of a recent study (Indiana LTAP, 2006). Lane width and the presence of pavement markings were recorded as part of the road condition survey.

A 1962 Engineering Bulletin published by Highway Extension and Research Project for Indiana Counties and Cities (HERPICC, the predecessor of Indiana LTAP) that was authored by Prof. Harold Michael concluded, "A major cause of accidents on county roads in Indiana is the narrow roadway and/or shoulders and the absence of centerlines. It is recommended that county highway programs of roadway and shoulder widening of major county roads be developed and aggressively pursued and that centerlines be placed on all arterial hard surface roads (HERPICC, 1962)."

Little has been done in the last forty-seven years to implement these recommended improvements. Part of the reason for the narrow lanes and small shoulders is the lack of adequate right of way to make such improvements. Right of way information is difficult to obtain, even for a specific location, so an accurate statewide inventory is nearly impossible. The best estimate that can be made is based on the information in the state road and street database maintained by INDOT. An analysis of this data was reported in the original 2001 report (Indiana LTAP, 2001) and indicates that nearly 40 percent of the county road right of way is less than 40 feet required by Indiana law for new county roads per IC 8-20-1-15, which states "A county highway right of way may not be laid out that is less than twenty (20) feet on each side of the centerline, exclusive of additional width required for cuts, fills, drainage, utilities, and public safety" (Indiana Code, 2008). It is reasonable to assume that the county owned right of way has not changed substantially since the 2001 analysis.

Based on the results of the road condition survey performed in 2008, over 50 percent of the county roads surveyed have widths less than 18 feet, which according to AASHTO standards is the absolute minimum width for county roads (AASHTO, 2004). Many roads with more than minimum traffic volumes or design speeds require widths up to 24 feet according to AASHTO standards, which is a very uncommon width for county roads in Indiana.

The road condition survey also recorded the presence of, or lack of, pavement markings. Since the 2001 report, the Manual on Uniform Traffic Control Devices (MUTCD) has been revised (FHWA, 2003). The new MUTCD requires or recommends that roads have edgeline and/or centerline markings based on traffic volumes and road widths; however, accurate and current traffic volume data is not available for county roads. The road condition survey indicated that 88 percent of paved county roads do not have edgeline markings and 72 percent of the paved county roads did not have centerline markings, so it is likely that a significant number of roads may be affected by the MUTCD guidelines. There is increased safety in using pavement markings, whether or not they are required by the MUTCD, as was suggested by Prof. Michael over 45 years ago (HERPICC, 1962) and confirmed by current recommendations (National Cooperative Highway Research Program (NCHRP), 2004). Therefore, funding estimates to increase the use of pavement markings are included in later sections of this report as a means of increasing traffic safety.

3.3.1. Traffic Volume

Traffic information is very difficult to estimate on a statewide basis because of the lack of complete traffic counts for county roads. Information on traffic volume on county roads varies from county to county, from very complete and up-to-date to nonexistent. A HERPICC study conducted in 1965 estimated annual travel on county roads at 5 billion annual vehicle miles traveled (AVMT), 20 percent of the statewide total of 25 billion AVMT (HERPICC, 1965). More recent estimates provided by FHWA (Drumm, 2009) indicate that vehicle miles of travel have increased substantially, and local roads continue to play an important function in statewide mobility. From 2003 to 2006, approximately 46 percent of the statewide travel was served by local roads, including county, city and town roads. This 46 percent represents a significant share of all travel, highlighting the important role of local roads. The AVMT on county roads is estimated to be 19 billion miles, and the AVMT on city and town roads is estimated to be 15 billion miles, contributing to the total AVMT on all roads in Indiana of 74.3 billion miles.

3.3.2. Traffic Safety

According to information provided by FHWA (Drumm, 2009), the injury crash rate on local roads in Indiana is more than twice the injury crash rate on state roads (including interstates and all state maintained roads), and 46 percent of the fatal crashes occurred on local roads. Local roads have fewer safety features and higher crash rates, resulting in fatalities, injuries and property damage. In spite of the larger volume of travel occurring on state routes, crash reports for the four year average from 2003 to 2006 (the most recent data available) show that 59 percent of the total crashes in Indiana occurred on locally maintained roads. Not only are there more crashes on local roads, but the percentage of total crashes occurring on locally maintained roads has increased from 55 percent in 1998 (Indiana LTAP, 2001) to 59 percent from 2003 to 2006.

Complete data regarding the percent of fatalities on local roads is not available for adjacent states, however, selected comparisons are possible. Indiana, with 46 percent of fatal crashes on local roads, has a slightly higher percent of fatal crashes on local roads than Illinois, where 41 percent of fatal crashes were on local roads (Illinois Department of Transportation, 2008). Both Kentucky, with 14 percent (Kentucky Transportation Center, 2008), and Minnesota, with 16 percent (Minnesota Department of Public Safety, 2008), have a much lower percentage of fatal crashes on local roads relative to all roads. In Michigan, data is based on the number of fatalities, rather than the number of fatal crashes, and 58 percent of the fatalities were on local roads (Michigan Office of Highway Safety Planning, 2008); this is higher than the 45 percent of fatalities on local roads in Indiana. In Indiana, Minnesota and Illinois, the percent of fatalities on local roads is within 2 percent of the percent of fatal crashes on local roads, indicative of the strong correlation between these two measures.

4. Condition Assessment of Existing Infrastructure

The local transportation infrastructure addressed in this report includes roads, bridges and culverts, and traffic safety features on the roads owned and maintained by Indiana counties, cities, and towns. Road condition assessment is based on data from a survey of paved roads in an eight county sample. These findings are extrapolated to provide an estimate of existing conditions on local roads in the state. Bridge condition assessment is based on the bridge inventory database for all bridges in the state over 20 feet. The condition of traffic safety features is based on previous research for traffic signs, and on data from the survey of eight counties for pavement markings and pavement width.

4.1. Survey of Pavement Condition of County Roads

The pavement condition assessment is an update to a survey of county roads originally conducted in 2001. There are almost 50,000 miles of paved roads in Indiana that are maintained by counties, making it impractical to collect data on the entire network. To estimate conditions on the local road network, a representative sample of eight counties was identified, and complete data on the paved roads in these eight counties was collected and extrapolated to the entire state.

The eight counties included in the pavement assessment are: Adams, Fayette, Floyd, Fountain, Hamilton, Lawrence, Pike and White. As illustrated in Figure 4.1 and Table 4.1, these eight counties were chosen in 2001 to provide a representative sample of all Indiana counties based on population, weather and environmental conditions, terrain, and local funding considerations.

Mandli Communications, Inc., headquartered in Madison, Wisconsin, was contracted to provide the pavement condition survey for the eight county sample. The same roads that were surveyed in 2001 were included in the 2008 survey. If a road surveyed in 2001 was turned over to a city, it was retained in the sample. The sample does not include roads that are currently paved but were not paved in 2001. Using the baseline data set from 2001 provides the opportunity for a comparison of road conditions in 2001 vs. 2008 and provides a reasonable data set to represent the local roads in the state.

Figure 4.1. Sample of Eight Counties Included in Road Condition Survey

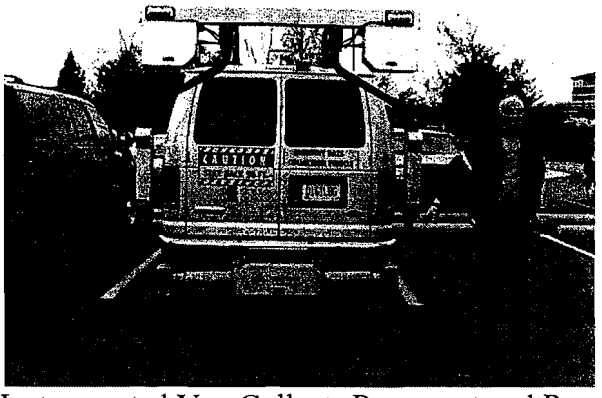
Table 4.1. County Data for Sample Counties					
County	Quadrant	Population		Mileage[1]	
		2000	2006[2]	Total mileage	Percent paved
Hamilton	NE	108,936	250,979	678	100%
Floyd	SE	64,404	72,570	322	100%
Lawrence	SW	42,636	46,413	670	99%
Adams	NE	31,095	33,719	697	72%
Fayette	SE	26,015	24,648	380	83%
White	NW	23,645	24,396	922	62%
Fountain	NW	17,808	17,486	667	40%
Pike	SW	12,509	12,855	549	37%

[1] Total mileage (INDOT, 2007), percent paved (Indiana LTAP, 2001), (Indiana State Board of Accounts, 2006/2007)
[2] 2001 population (Indiana LTAP, 2001), 2006 population (US Census Bureau, 2008).

The survey vehicle used for the assessment is shown in Figure 4.2 and is among the most sophisticated working in the industry today; an experienced crew was used to conduct the survey. Advantages of contracting this work included results that were consistent from county to county, since the same team was used throughout the state, and complete objectivity, because the contractor had no prejudice as to the results. The survey results are objective, consistent, and up-to-date.

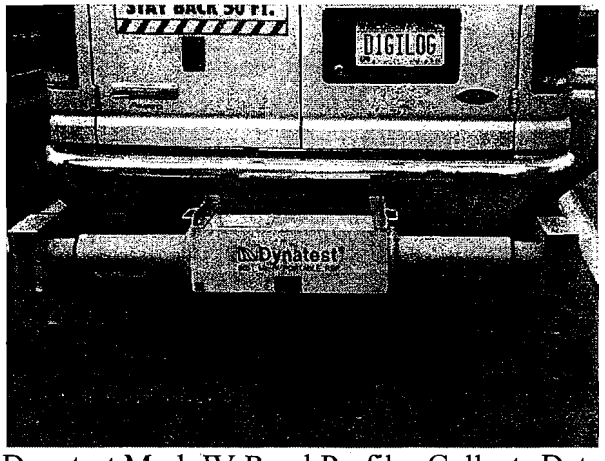
Information collected during the survey included verification of section length, as well as road width, presence of pavement markings, PASER condition rating, and calculated road roughness according to the International Roughness Index (IRI). The PASER condition rating system provides a numerical rating on a scale of 1 (totally failed) to 10 (excellent) of the road surface (Walker et al, 2002). Ratings guides, including photographs and descriptions of each condition level, are available for the inspector to use as a guide. Illustrated examples of PASER ratings are shown in Appendix B. State routes are evaluated using a different, but similar system called the Pavement Condition Rating (PCR), which is on a scale up to 100, with 100 as the best possible road and anything less than 70 considered poor.

The IRI is a standard measure of the smoothness of the road surface and is calculated based on the measured road profile. The IRI was developed to provide an international and objective measure of road smoothness, and is recognized as a standard by the World Bank. The IRI is not a subjective evaluation of the inspector. A new pavement would be expected to have an IRI value of 60 inches/mile or 70 inches/mile (Sinha et al, 2005). IRI values less than 100 inches/mile generally reflect pavement in excellent condition, and IRI values over 200 inches/mile typically reflect distressed pavement in poor condition. The IRI data was collected using a Dynatest Mark IV road surface profiler.



Instrumented Van Collects Pavement and Road Data

Imaging System Provides Digital Images for PASER Assessment



Dynatest Mark IV Road Profiler Collects Data for IRI

GIS Based System Correlates Data Collected with Exact Road Location

Figure 4.2. Survey Vehicle Used to Collect Pavement Data

Summary results of the road condition survey, as well as information about INDOT roads, are shown in Table 4.2 (condition ratings) and Table 4.3 (IRI). Categories based on the PCR scale (used by INDOT), the PASER scale (used on county roads), and the IRI roughness scale are shown in Table 4.4. More detailed information about the road condition survey results for the eight county sample is shown in Table 4.5.

Table 4.2. Summary of Road Condition Rating Results		
Agency	**Results**	
County Roads (PASER)	**Average (10 = excellent)**	**Percent of Miles with PASER 4 or less**
2001	5.5	28%
2008	4.5	51%
INDOT (PCR)	**Average (PCR) (100 = excellent)**	**Percent of Miles with PCR less than 50**
2001	91	20%
2008	94	0%

Table 4.3. Summary of Road Condition Roughness Results		
Agency	**Average IRI in inches/mile (under 100 = excellent)**	**Percent of miles IRI > 125 inches/mile (IRI 125 is breakpoint for smooth)**
County Roads		
2001	203	86%
2008	199	77%
INDOT		
2001	107	21%
2008	95	19%

Table 4.4 Road Assessment Metrics

a. Condition Rating Scales

PCR (Used by INDOT)

Value	Category
90-100	Excellent
80-90	Good
70-80	Fair
Below 70	Poor

PASER (County Roads)

Value	Category
10	Excellent
9	Excellent
8	Very Good
7	Good
6	Good
5	Fair (maintenance recommended)
4	Fair (improvement recommended)
3	Poor
2	Very Poor
1	Failed

b. IRI Roughness Scale

Inches/mile	Category[1]
60 to 100	Excellent
100 to 150	Good
150 to 200	Fair
Over 200	Poor

[1] Categories for IRI used in 2001 report per INDOT (LTAP, 2001).

Table 4.5. Road Condition Survey Results by County							
County	Paved Miles Surveyed	Condition Rating (PASER)			IRI Roughness (inches/mile)		
		Average	PASER <= 4 Fair to Poor		Average	IRI > 200 > 200 = Poor	
			Mileage	Percent of miles		Mileage	Percent of miles
Adams	411	5.7	28	7%	172	116	28%
Fayette	269	3.5	207	77%	257	252	93%
Floyd	258	4.7	130	50%	182	70	27%
Fountain	256	4.1	152	59%	190	102	40%
Hamilton	693	5.5	213	31%	141	78	11%
Lawrence	570	3.3	470	83%	258	457	80%
Pike	147	4.2	82	56%	209	58	39%
White	528	4.3	308	58%	211	298	56%
Total or Weighted Average	3,132	4.5	1,589	51%	199	1,430	46%

Note: The total does not always equal the sum of the county data shown due to rounding.

As shown in Table 4.5, the average PASER condition rating for county roads was 4.5, or Fair condition. The average IRI roughness was 199 inches/mile, also Fair, very close to the threshold of poor. Approximately 77 percent of county roads have an IRI greater than 125 inches/mile, in the 2001 survey this was used as the breakpoint between "smooth" and "rough" pavements, according to industry literature at the time. By comparison, 19 percent of state routes would be considered "rough" by this measure. Current industry guidelines indicate higher IRI thresholds for county roads, as discussed in the following section.

4.1.1. IRI for County Roads

According to Table 4.3, the average roughness of county roads improved from 2001 to 2008. However, inspection of Table 4.4 indicates that the IRI value differs dramatically from county to county. The average values provided in this report are weighted averages, and the average IRI value is significantly affected by Hamilton County, which has the lowest IRI value of the counties surveyed (141 inches/mile), and more mileage than any other county surveyed (693 miles). These two factors had a dramatic impact on the weighted average for the state. The weighted average IRI for the sample without Hamilton County is 215 inches/mile.

The acceptable IRI value varies depending on the road characteristics, including the designation (e.g., interstate, National Highway System (NHS), or non-NHS) and the volume of vehicles using the road. Although there are no widely established standards for IRI values for county roads, Table 4.6 provides IRI guidelines by Road Type (Pennsylvania Department of Transportation, 2006). IRI designations shown in columns C and D may be appropriate for consideration for county roads. By these guidelines, roads with an average daily traffic (ADT)

Table 4.6. IRI Guidelines by Road Type

IRI Category (inches/mile)	A Interstate Routes	B NHS Non-Interstate Routes	C Non-NHS Routes with ADT >= 2,000[1]	D Non-NHS Routes with ADT < 2,000[1]
< 60	Excellent (< 60)	Excellent (< 60)	Excellent (<= 94)	Excellent (<= 119)
60-94	Good (60 – 94)	Good (60 - 119)		
95 – 119	Fair (95 – 150)		Good (95 - 144)	
120 – 144		Fair (120- 170)		Good (120 - 170)
145 – 150			Fair (145 - 194)	
151 – 170	Poor (>= 151)			
171 – 194		Poor (>= 171)		Fair (171-220)
195 – 220			Poor (>= 195)	
> 220				Poor (>= 220)

[1] ADT: Average daily traffic.

of more than 2,000 vehicles per day and an IRI of 195 inches/mile, or roads with fewer than 2,000 vehicles per day and an IRI of 220 inches/mile, would be considered poor. Consultation with INDOT pavement management engineers yielded a recommendation that an IRI threshold of 200 inches/mile be used to identify county roads that should be improved through resurfacing, rehabilitation, or reconstruction. Using this threshold of 200 inches/mile as a maximum acceptable value, 46 percent of the county roads surveyed should be improved.

There are many advantages of having smoother roads besides a smoother drive. Rough pavement negatively affects safety, fuel efficiency, and vehicle wear and tear, as well as pavement durability (FHWA, *Pavement Smoothness Methodologies*). Driving on smoother roads can save drivers hundreds of dollars a year in fuel and vehicle maintenance costs. The increase in vehicle operation costs (VOC) associated with increased road roughness for various vehicle types is shown in Figure 4.3.

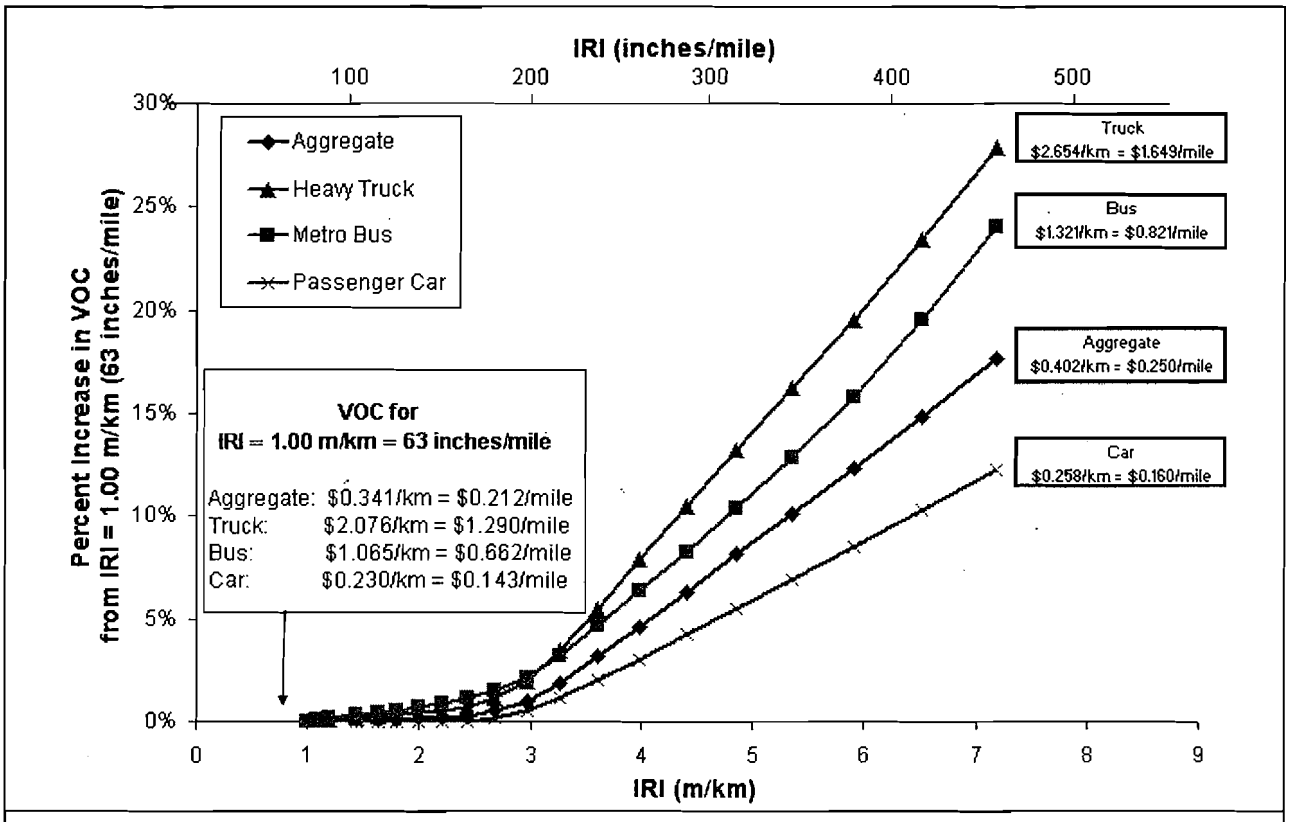


Figure 4.3. Road User Costs Increase with Increased Road Roughness

(Washington Department of Transportation, *Pavement Management*)

4.2. Bridge Conditions

The National Bridge Inspection Standard (NBIS) requires a biennial inspection of all public bridges 20 feet and longer. A standard has been established so that similar data is collected for every state and local bridge in the United States, regardless of who performs the inspection. Qualifications have been established for the inspectors and a comprehensive course approved by the FHWA is required to ensure consistency. Analysis in this report is based on 2007 data, the most recent data available from the NBIS.

Before any further discussion of bridge conditions is made, it is important to define some of the terminology. Several of the criteria that are used in this report are sufficiency rating, deficiency, and posting. Each of these terms is defined below.

- ***Sufficiency Rating*** - The sufficiency rating of a bridge is a numerical rating on a scale of 0 (poor) to 100 (excellent) that indicates the sufficiency of the structure to remain in service. It is calculated based on data collected during the NBIS inspection and includes factors such as condition, bridge geometry, traffic volumes, and the length of alternate routes. The sufficiency rating is one of the primary factors considered in determining whether federal funds may be used to replace a given structure. FHWA rules require that

a bridge must have a sufficiency rating of less than 50 to be eligible for replacement, and less than 80 to be eligible for rehabilitation.

- ***Deficiency (SD or FO)*** - Whereas the sufficiency rating is a measure of sufficiency, the deficiency is a classification reflecting the limitations of a bridge in terms of service. There are two types of deficient bridges, structurally deficient (SD) and functionally obsolete (FO). A structurally deficient bridge is restricted to light vehicles due to deterioration of the bridge components. A bridge designated FO has limitations such as poor deck geometry, reduced load capacity, or a road alignment that does not meet the same standard as the connecting roadway. A bridge could be in good condition but still be designated FO due to inadequate lanes widths or other substandard features.

- ***Posting*** - Posting refers to the placement of a sign or other traffic control due to some inadequacy of the bridge. Most commonly bridges are posted for load, which is indicative of an SD rating. Bridges in Indiana are posted for load when the most conservative analysis, called the inventory rating, produces load capacities less than 16 tons. Bridges may also be posted because they are FO, for example, due to a narrow width, one lane cross section, or reduced vertical clearance.

Although overall Indiana bridges rank 19th nationally (a rank of 1 indicates the best bridges), Indiana's county bridges are a concern. Figure 4.4 provides a comparison of deficient bridges in Indiana and surrounding states, for both county and state bridges. Only two of the five states (Indiana and Ohio) have a higher percentage of county bridge deficiencies compared to state bridge deficiencies; Indiana has a much larger discrepancy between the percent of county bridges that are deficient as compared to the percent of state bridges that are deficient.

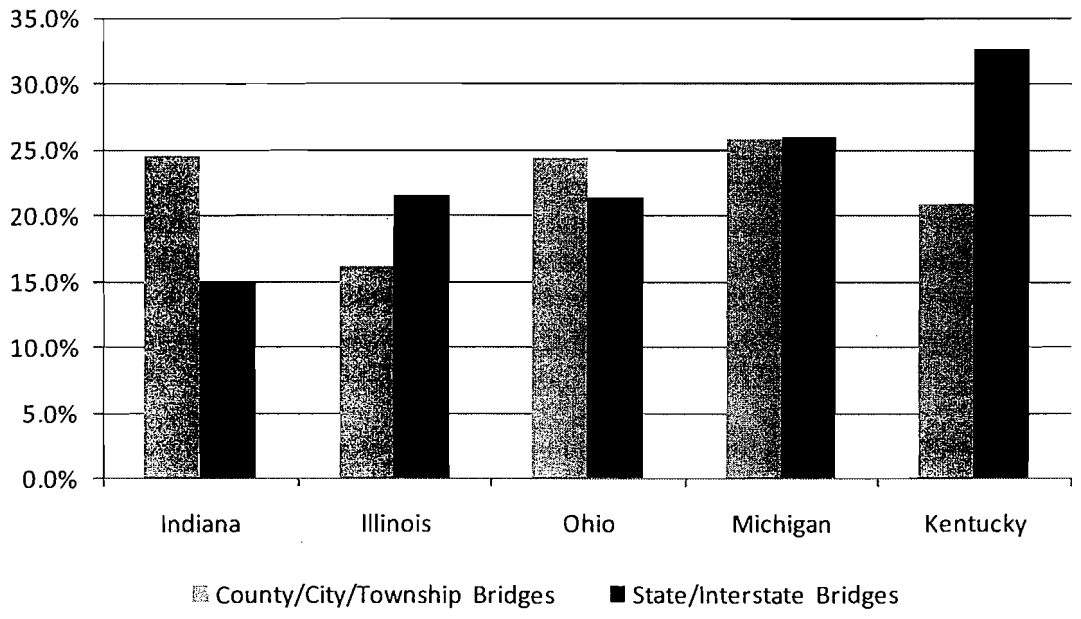


Figure 4.4. Comparison of Deficient Bridges in Indiana and Adjacent States

Table 4.7 provides additional information on county bridges in Indiana, as well as some information on state bridges as a comparison. According to the table, 25 percent of the county bridges are classified as either SD or FO, while 12 percent have sufficiency ratings less than 50. Thirteen percent of county bridges are posted for load, and 75 percent of the posted bridges are posted for loads less than 15 tons. This means that more than 9 percent of all county bridges cannot be crossed by school buses. Twenty-five percent of county bridges are older than 50 years; and some of these bridges are designated historic structures. Approximately 99 percent of all historic bridges in Indiana are maintained by local agencies.

Table 4.7. State and County Bridge Conditions

Criteria	County Bridges 12,836 Total		State Bridges 5,596 total	
	Number of Bridges	Percent of County Bridges	Number of Bridges	Percent of State Bridges
Sufficiency Ratings < 50	1,571	12%	148	3%
SD/FO	3,152	25%	860	15%
Posted	1,622	13%	36	1%
Historical Bridges	120	1%	N/A	N/A
Greater than 50 yrs old	3,148	25%	390	7%

N/A = not available.

One method for bridge replacement is to determine the frequency at which bridges should be replaced (the bridge life), then replace a corresponding number of bridges each year (equal to the inverse of the bridge life times the total number of bridges). For example, if the normal life of a bridge is 70 years, then 1/70, or 1.4%, of the bridge inventory should be replaced every year. An average bridge life span of 70 years was reported in a 2005 report done by Indiana LTAP (Indiana LTAP, 2005) and was used in a Joint Transportation Research Program (JTRP) study (Sinha et al, 2005). It is an appropriate value with the assumption that the bridge will undergo one major rehabilitation in its lifetime. The average age of the existing bridges included in the "eligible for replacement" list is 75 years, but there is no way of knowing how many of these bridges have been on the list for several years. Figure 4.5 shows that in 2007 only seven counties in Indiana were on pace with the bridge program proposed above. These seven counties have less than 1.4% of their bridge inventory on the replacement list, which is consistent with the proposed bridge program.

4.3. Traffic Safety

Traffic safety on local roads encompasses a number of factors. This report assesses traffic signs on all local roads, and pavement markings and pavement width on county roads. This report also provides an overview of safety on local roads in Indiana.

4.3.1. Traffic Signs on Local Roads

Visible and appropriate traffic signs provide information to drivers and contribute to transportation safety. The Manual on Uniform Traffic Control Devices (MUTCD) provides guidance on the use of traffic signs. As stated in Section 2A.01 of The Manual on Uniform Traffic Control Devices (MUTCD), "The functions of signs are to provide regulations, warnings, and guidance information for road users" (FHWA, 2003).

To remain effective, signs must accurately display their intended information without ambiguity. A major factor in the legibility of a sign is the retroreflectivity characteristics. The level of retroreflectivity becomes even more important when considering the aging population of the United States. As Americans get older, several changes occur in their visual capabilities which directly impact the driving task. These changes include reduced visual acuity, reduced visual contrast sensitivity, increased susceptibility to glare and slower glare recovery, reduced sensitivity to changes in angular size and motion, poorer visual pattern perception and visualization of missing information, less efficient visual search, and reduced area of visual attention (Potts et al, 2004).

Section 2A.08 of the MUTCD states that, "Regulatory, warning, and guide signs shall be retroreflective or illuminated to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion in this Manual of a particular sign or group of signs" (FHWA, 2003).

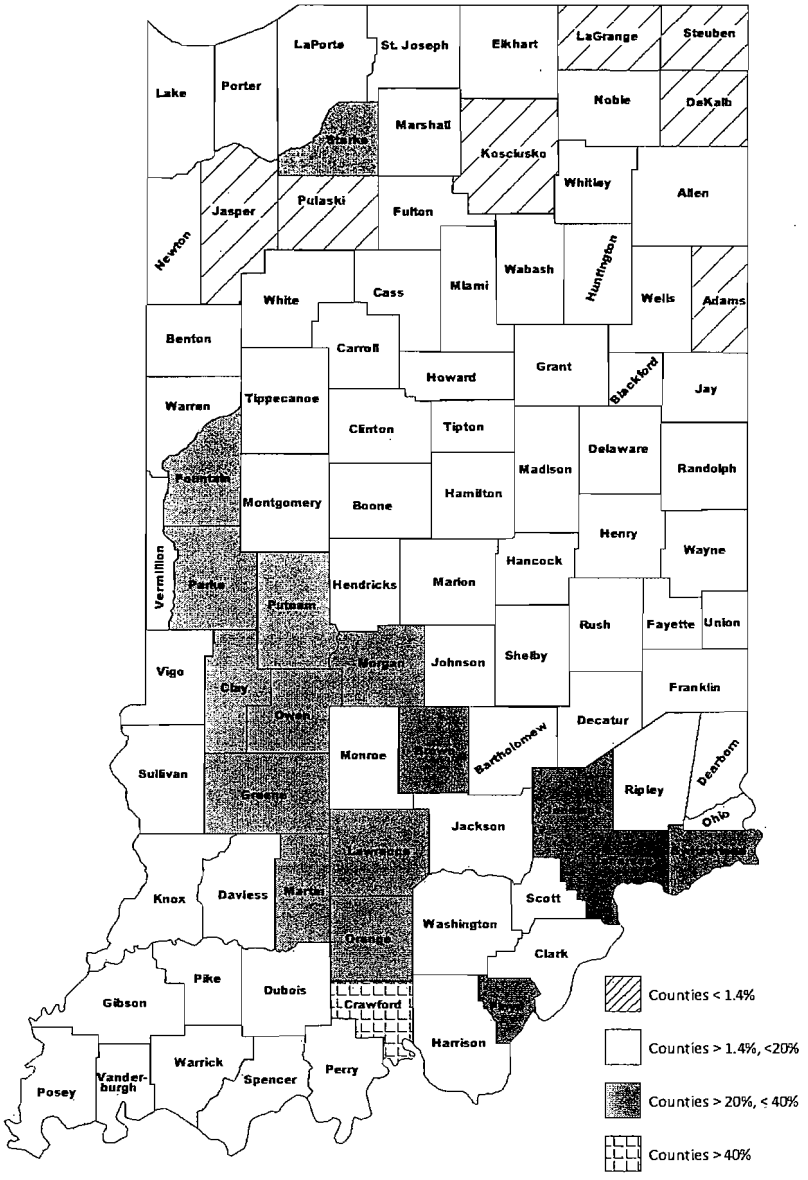


Figure 4.5. 2007 County Bridge Eligibility for Replacement Using Federal Aid

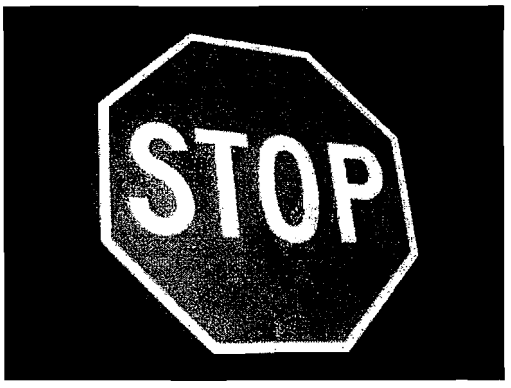
Although a sign inventory was not conducted as part of this needs assessment, recommendations for local needs are included in this report based on the findings and recommendations of a recent study on sign retroreflectivity that was conducted to evaluate the condition of existing signs on local roads, including counties, cities and towns (Indiana LTAP, 2006). Evaluation of sign

condition was based on both a visual assessment and a quantitative measure of retroreflectivity. Signs in poor condition, which may include faded paint, low contrast between the background and words or symbol, or low retroreflectivity, result in reduced visibility and may compromise the safety of the road. Figure 4.6 illustrates the range of signs on local Indiana roads.

a) Faded Sign on Indiana County Road

b) Faded sign on Indiana County Road

c) New Sign during Daytime has Increased Visibility and Safety



d) New Sign at Night has Increased Visibility and Safety

Figure 4.6. Illustration of Sign Visibility on Local Roads in Indiana

The sign retroreflectivity study provided an estimate of the density of signs per mile and the density of failed signs per mile. These values, combined with the current mileage for local agencies (provided by INDOT) were used to estimate the number of signs and the number of failed signs that need to be replaced, as shown in Table 4.8. Multiplying the density of failed signs by the current number of miles in the counties, cities and towns, it was estimated that over 245,000 signs need to be replaced by local agencies.

Table 4.8. Results of Survey of Local Traffic Signs					
	Density of Signs (per mile)	**Density of Failed Signs (per mile)**	**Number of Miles**	**Estimated Number of Signs**	**Estimated Number of Signs Requiring Replacement**
County	3.2	1.1	66,150	211,680	72,765
City and Towns	26.0	9.5	18,133	471,458	172,264
Total				683,138	245,029

4.3.2. Pavement Markings on County Roads

Pavement markings include both edgeline marking and centerline marking. Edgeline marking delineates the edge of the pavement, and is recommended as a countermeasure to reduce the incidence of run-off-the-road crashes (NCHRP, 2004). Centerline marking provides delineation from opposing traffic, and is recommended as a counter measure to reduce the incidence of crossover and sideswipe crashes (NCHRP, 2004). The survey of eight counties in Indiana indicated that approximately 88 percent of paved roads do not have edgeline marking, and approximately 72 percent of paved roads do not have centerline marking, based on a weighted average as shown in Table 4.9.

Table 4.9. Results of Survey of Pavement Markings					
County	**Number of Paved Miles Surveyed**	**No Edgeline Marking**		**No Centerline**	
		Number of Miles	**Percent**	**Number of Miles**	**Percent**
Adams	411	402	98%	381	93%
Fayette	269	269	100%	263	98%
Floyd	258	221	86%	54	21%
Fountain	256	212	83%	212	83%
Hamilton	693	509	73%	260	37%
Lawrence	570	563	99%	544	96%
Pike	147	144	98%	144	98%
White	528	435	82%	390	74%
Total	3132	2,754	88%	2,248	72%

The safety benefits associated with the addition of an edgeline and centerline are based on research that analyzes the reduction in crashes after improvements are made. The addition of edgeline marking has been reported to reduce the likelihood of targeted crashes by

approximately 20 percent. The addition of centerline marking has been reported to reduce the likelihood of targeted crashes by approximately 30 percent (Gan et al, 2005).

4.3.3. Pavement Width on County Roads in Indiana

Adequate pavement width is an important road characteristic that contributes to safety by separating vehicles travelling in opposite directions. The survey of eight counties in Indiana indicated that approximately 53 percent of paved roads are less than 18 feet wide, based on a weighted average. The results for each county are shown in Table 4.10.

Table 4.10. Results of Survey of Road Width

County	Number of Paved Miles Surveyed	Less Than 18 feet Wide	
		Number of Miles	Percent
Adams	411	207	50%
Fayette	269	202	75%
Floyd	258	82	32%
Fountain	256	160	63%
Hamilton	693	238	34%
Lawrence	570	479	84%
Pike	147	122	83%
White	528	165	31%
Total	3,132	1654	53%

Widening the road can provide safety benefits. Widening the road from 16 feet to 18 feet provides an additional 1 foot for each side, and may be expected to result in a reduction in head-on, sideswipe and run-off-the-road crashes. Increasing the road by 2 feet would be expected to result in 12 percent fewer crashes (Gan et al, 2005).

4.3.4. Safety Statistics in Indiana

FHWA tabulates safety data for Indiana counties (Drumm, 2009). Safety data for the eight county sample used in this study is shown in Table 4.11. These summary statistics are based on data from 2003 to 2006, and represent an average for these four years. Based on examination of the range of rankings for the fatality rate, injury rate and combined fatality and injury rate, the eight county sample appears to adequately represent the range of counties in the state, with rankings ranging from 2 to 87, and averages ranging from 42 to 47 for the 92 counties in Indiana.

Safety statistics for the State of Indiana are shown in Table 4.12. Both the injury rate (row f) and the fatality rate (row i) are higher for local roads, as compared to state roads. The injury rate for local roads is 116.6 injuries per 100 million vehicle miles travelled (MVMT), which is more than

Table 4.11. Safety Statistics for Eight County Sample

County	Ave population 2003-2006	Local road fatality rate[1] (per 100 MVMT[2])	Rank based on fatality rate (local miles of travel)[3]	Local road injury rate (per 100 MVMT)	Rank based on Injury rate (local miles of travel)[3]	Combined fatality and injury (local roads)	Rank Combined fatality and injury (local roads)[3]
Pike	12,870	0.29	2	33.77	7	5.33	2
White	24,620	1.17	39	55.52	22	27.67	22
Hamilton	235,687	0.65	9	81.84	52	37.67	35
Fountain	17,539	1.74	75	61.35	29	44.33	45
Fayette	24,845	1.16	37	82.99	54	48.33	50
Lawrence	46,307	1.07	31	124.34	74	59.67	59
Adams	33,725	2.29	87	76.77	47	60.33	61
Floyd	71,817	1.43	57	154.60	87	77.00	86
Low	12,870	0.29	2	33.77	7	5.33	2
Average	58,426	1.23	42	83.90	47	45.04	45
High	235,687	2.29	87	154.60	87	77.00	86

[1] Local roads include all roads not on the state system.
[2] MVMT = million vehicle miles traveled.
[3] Rank based on 92 counties in state. A rank closer to 1 indicates lower crash rates or safer roads. A rank closer to 92 indicates higher crash rates or less safe roads.

Table 4.12. Safety Statistics for Indiana

	Local Roads[1]	State Roads	All Roads
a) Total Crashes[2]	114,830 (59%)	60,139 (31%)	194,708
b) Property Damage Only (PDO) Crashes	89,500 (58%)	46,297 (30%)	154,046
c) Injury crashes	24,953 (63%)	13,401 (34%)	39,840
d) Fatal Crashes	337 (46%)	441 (54%)	822
e) Injuries	36,278	19,882	56,160
f) Injury Rate per 100 MVMT[3]	116.57	50.73	81.14
g) Injury Rate per 100,000 People	N/A	N/A	965.17
h) Fatalities	408	491	899
i) Fatality Rate per 100 MVMT[2]	1.23	1.21	1.22
j) Fatality Rate per 100,000 People	N/A	N/A	14.48
k) Percent Travel by Road Type	46.2%	53.8%	100%

[1] Local roads include all roads not on the state system.
[2] The total crashes on all roads does not equal the number of crashes on local roads plus the number of crashes on state roads because some crash locations are unknown or not specified.
[3] MVMT = million vehicle miles traveled.

twice the injury rate for state roads, 50.7 injuries per 100 MVMT. The percent of travel served by the local roads vs. state roads varies by county, and on average 46 percent of all vehicle miles travelled (VMT) are served by local roads. Statistics related to VMT on state maintained facilities are dramatically affected by the number of interstate miles in the county; this should be kept in mind when comparing the statistics of local and state roads. Over 59 percent of all crashes are on local roads, even though only 46 percent of all travel is on local roads. This disparity illustrates that there is a lot of room for improving the safety of local roads.

This report estimates the costs for road widening, pavement marking and replacement of failed signs, programmatic improvements that have been proven to enhance road safety. This report does not quantify the need or associated cost for improvements at high crash locations (HCLs) or additional programmatic improvements, although these strategies are recommended for local agencies.

Improvements in response to HCLs and additional programmatic improvements are appropriate, but will vary for different counties in the state. This is illustrated by Table 4.13, which provides crash data for the eight county sample. The data shown is for all crashes and for all jurisdictions in the county, and includes crashes on state-maintained roads, as well as county, city and town roads. Examination of the data in Table 4.13 illustrates that the nature of crashes varies substantially from county to county. For example, Hamilton and Floyd Counties, both suburban counties, have a majority of crashes identified as urban and have a higher percent of crashes at intersections than more rural counties, such as Pike, White and Fountain, where collisions with deer, trees and utility poles are more prevalent. The specific programmatic improvements that will have the greatest impact on improving safety will vary substantially from county to county. Additional information regarding safety on local roads is provided in Appendix C.

Table 4.13. Crash Data for Eight County Sample

Crash Characteristic[1]	Adams	Fayette	Floyd	Fountain	Hamilton	Lawrence	Pike	White
Urban	59.2%	63.8%	73.8%	36.0%	81.5%	50.2%	13.5%	35.3%
Rural	40.1%	36.0%	25.5%	64.0%	18.3%	49.7%	81.6%	64.3%
Driver Age								
16 to 20	20.3%	17.1%	19.2%	21.3%	17.3%	22.2%	24.2%	17.4%
>= 70	8.5%	8.0%	5.6%	5.9%	4.0%	6.7%	4.2%	6.5%
Intersections	30.1%	30.0%	30.5%	19.2%	41.4%	31.7%	18.2%	24.5%
Surface								
Ice, snow or slush	13.4%	9.2%	4.0%	12.8%	7.5%	6.6%	8.9%	12.5%
Wet	14.6%	17.5%	18.8%	13.9%	17.1%	18.7%	14.6%	16.9%
Collision with Object								
Deer	10.8%	11.0%	4.8%	19.9%	3.1%	7.4%	12.3%	19.5%
Tree	2.1%	2.8%	2.4%	5.8%	2.0%	5.9%	6.9%	1.2%
Utility Pole	4.1%	4.1%	2.1%	4.2%	1.6%	3.6%	5.8%	4.0%
Curves	5.8%	9.8%	12.7%	12.9%	8.6%	18.6%	22.5%	9.0%
Overturn/ Rollover	1.2%	1.5%	0.6%	5.0%	0.5%	1.6%	5.2%	3.8%
Pedestrians involved per 100,000 population	13.0	43.5	58.2	17.1	21.9	24.2	7.8	32.5
Bicycles involved per 100,000 population	14.2	18.5	22.6	11.4	11.5	12.5	1.6	7.3

[1] Percent of total, unless otherwise stated for pedestrians and bikes.

5. Funding Needs and Capabilities

The funding assessment includes two components. The first is the funding needed to address current system deficiencies. This funding component is referred to as the short-term funding and reflects the immediate need to address the backlog caused by historic funding shortfalls. This short-term funding includes the funding needed to improve deficient bridges and pavement, as well as safety improvements related to deficient signs, pavement markings and inadequate road width. The short-term funding need has been calculated as a lump sum, although it might be desirable to spread this expense over a period of five to ten years. The short-term funding is expressed in current dollars, and if the expense is spread out over a period of years then it should be adjusted to reflect inflation. The second funding component is the annual funding required to maintain the infrastructure on the proposed maintenance and rehabilitation schedule. This component is long-term, reflecting the need for on-going maintenance and reconstruction. The annual funding is expressed in current dollars and does not reflect the impact of inflation. The annual funding component assumes that the infrastructure is in reasonable condition; the cost of bringing the current infrastructure up to reasonable condition is reflected in the short-term funding component.

The funding needs are conservative because they reflect the needs of the existing transportation system, but do not include any expansion of the existing transportation system. Expansion occurs in both urban and rural areas. In rural areas, expansion most often takes the form of converting aggregate-surface roads to paved roads. In urban areas, the expansion is in the form of new roads and added travel lanes to existing roads.

5.1. Available Funding Sources

The sources of available funding vary for roads and bridges, as discussed below.

There are two major funds to maintain local transportation facilities in Indiana, these funds are derived from the state excise tax and taxes on gasoline and special fuels and other fees. These funds are referred to as the Motor Vehicle Highway (MVH) and Local Road and Street (LRS) distributions, and are received monthly by the LPAs from the Auditor of State's office. The distribution of these funds is based on formulae that consider road mileage, population, and the number of vehicle registrations (in some cases only passenger vehicles, in other cases total vehicle registrations). Figure 5.1 provides a flowchart outlining transportation funding in Indiana. Major Moves is shown on the chart, but the Major Moves funding was only a two-year

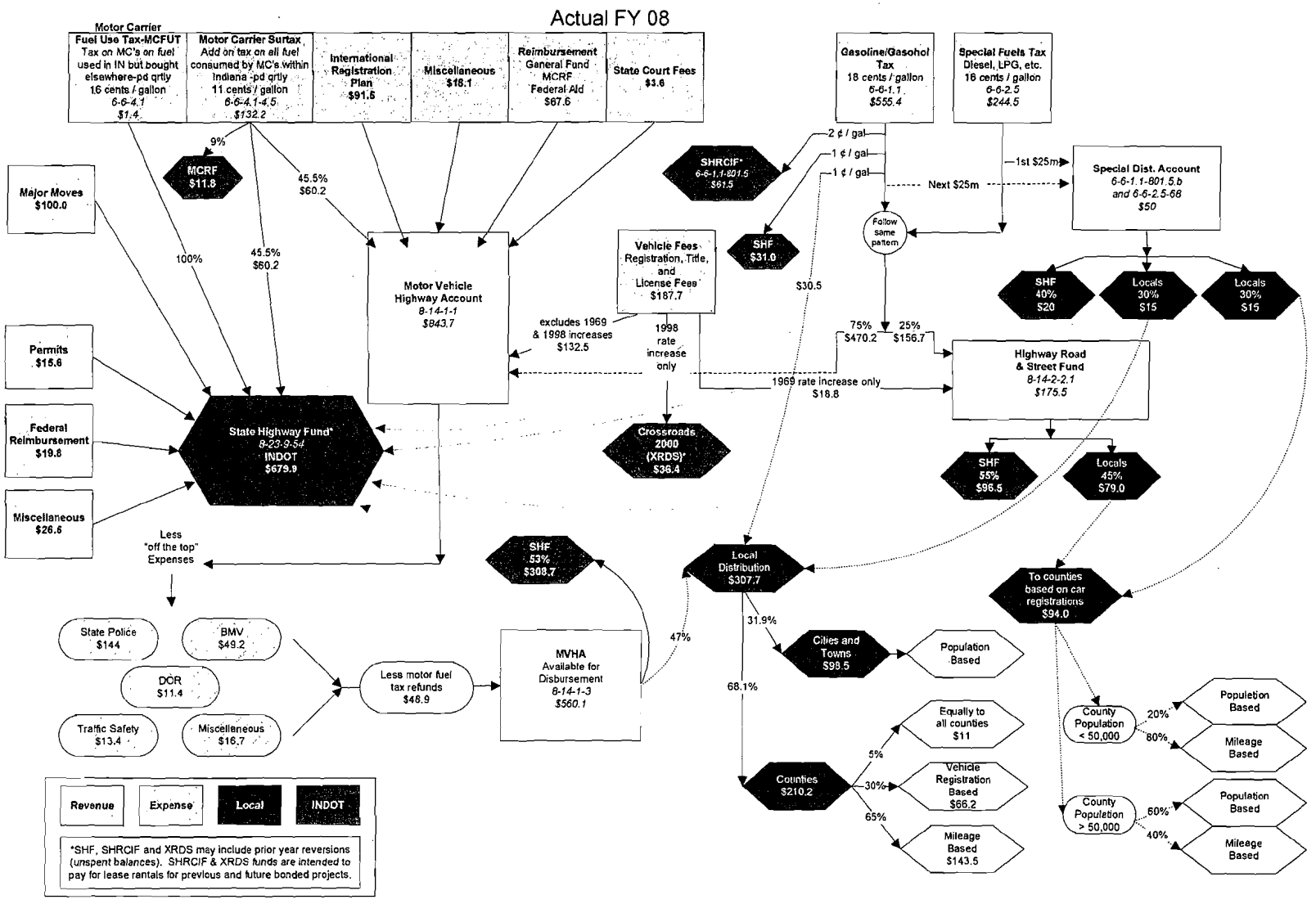


Figure 5.1. Indiana Transportation Funding (FY 08, all $ in Millions)

commitment which ended in 2007. The Major Moves program provided a total of $150 million dollars that was distributed among the counties, cities and towns of Indiana; Major Moves money was provided in addition to the MVH and LRS funds.

5.1.1. Motor Vehicle Highway Funds

The MVH fund is the primary funding source for county highway, city and town street departments. MVH funds may be used for all legal expenses of the agency, including administrative and operational expenses, road maintenance and construction, equipment maintenance and replacement, snow and ice control, fuel, and other supplies. Summaries of the revenues, expenses, and distributions from the MVH fund over the last ten years are shown in Tables 5.1, 5.2, and 5.3.

Table 5.1. MVH Fund Revenues, Last Ten Years

State FY	Fuel Taxes	Vehicle Taxes & Fees	Other	Total Gross Receipts	Refunds	Net Receipts
07 - 08	$531,575,289	$226,541,016	$17,313,838	$775,430,143	$48,899,995	$726,530,148
06 - 07	$507,920,635	$230,656,214	$17,272,001	$755,848,850	$35,684,838	$720,164,012
05 – 06	$529,605,814	$219,207,960	$18,636,083	$767,449,858	$48,983,670	$718,466,188
04 – 05	$521,194,072	$228,413,257	$21,929,315	$771,536,644	$47,044,966	$724,491,678
03 – 04	$510,761,667	$224,239,001	$22,030,049	$757,030,717	$43,318,433	$713,712,284
02 – 03	$500,180,079	$209,894,124	$18,298,382	$728,372,586	$44,470,315	$683,902,271
01 – 02	$494,258,076	$220,098,244	$18,499,595	$732,855,916	$39,146,134	$693,709,782
00 – 01	$489,580,782	$189,286,939	$12,112,033	$690,979,754	$33,777,516	$657,202,238
99 - 00	$498,167,131	$215,841,674	$12,598,610	$726,607,415	$34,615,976	$691,991,439
98 - 99	$481,034,318	$194,646,232	$11,213,980	$686,894,530	$34,355,913	$652,538,617

Table 5.2. MVH Fund Expenses, Last Ten Years

State FY	Net Receipts	Net State Police Expense[1]	Bureau of Motor Vehicles	IDOR Motor Fuel Division[2]	Traffic Safety	Other Expenses	Total Expenses	Total Adjustments	Net Amount Distributed
07 - 08	$726,530,148	$86,500,848	$50,031,211	$11,353,182	$16,146,115	$300,150	$164,331,505	$27,106,070	$589,304,713
06 - 07	$720,164,012	$75,920,344	$41,905,326	$10,767,076	$18,435,981	$4,931,351	$151,959,718	$21,848,342	$590,052,636
05 – 06	$718,466,187	$68,217,305	$38,760,213	$12,043,846	$16,809,572	$2,510,279	$138,341,215	$29,832,192	$609,957,163
04 – 05	$724,491,678	$53,443,632	$42,755,498	$9,762,440	$16,691,650	$602,128	$123,255,350	$22,770,102	$624,006,431
03 – 04	$713,712,645	$54,518,324	$44,579,944	$8,356,180	$16,785,983	$707,658	$124,948,089	$31,372,164	$620,136,720
02 – 03	$683,902,271	$55,314,458	$48,339,611	$6,679,906	$15,233,134	$912,282	$126,479,391	$7,464,099	$564,886,978
01 – 02	$693,709,782	$50,206,895	$40,919,212	$8,636,025	$11,708,230	$1,074,011	$112,544,373	$4,642,260	$576,523,149
00 – 01	$657,202,238	$59,025,314	$40,895,838	$5,757,841	$5,912,748	$816,299	$112,408,039	$3,000,980	$541,793,219
99 - 00	$691,991,438	$56,830,778	$40,286,144	$6,395,352	$5,651,782	$7,045,104	$116,209,159	$1,855,394	$573,926,886
98 - 99	$652,538,617	$54,249,833	$34,592,733	$5,120,110	$4,251,223	$4,022,761	$102,236,660	$2,752,316	$547,549,640

[1] The increase in Net State Police Fund reflects a change in policy in FY 05 - 06 and beyond.
[2] IDOR: Indiana Department of Revenue.

Table 5.3. MVH Fund Distributions, Last Ten Years				
State FY	INDOT	Counties	Cities & Towns	Total
07 - 08	$297,902,590	$198,158,936	$93,243,187	$589,304,713
06 – 07	$301,104,992	$196,481,542	$92,466,101	$590,052,636
05 – 06	$309,798,897	$204,101,552	$96,056,714	$609,957,163
04 – 05	$316,217,254	$209,287,281	$98,501,895	$624,006,430
03 – 04	$281,420,767	$228,620,789	$110,095,164	$620,136,720
02 – 03	$241,259,413	$218,455,088	$105,172,477	$564,886,978
01 – 02	$307,965,329	$182,543,810	$86,014,010	$576,523,149
00 – 01	$288,688,588	$172,027,407	$81,077,224	$541,793,219
99 - 00	$305,112,271	$182,721,278	$86,093,337	$573,926,886
98 - 99	$311,609,024	$192,667,151	$93,273,465	$597,549,640

Table 5.4 reflects an analysis of the Operational Reports for all counties and for municipalities with a population over 20,000. This table clearly illustrates why most LPAs are not able to use any significant portion of their MVH distribution for road construction and maintenance. It shows that on average 97 percent of MVH funds are consumed by the major administrative and operational expenses in both counties and municipalities. This leaves only about 3 percent of the MVH distribution available for bituminous supplies or road maintenance. Minor maintenance such as crack sealing and patching can often consume all of these remaining funds. Therefore, the primary funding available for road maintenance and repaving are the LRS funds; the LRS funds are used to determine the annual shortfall associated with the long-term need.

Table 5.4. Administrative and Operational Expenses (MVH Funds)		
Type of Expense	Percent of MVH Budget Average	
	Counties	Municipalities
Personal Services (salaries, wages, and benefits)	47%	56%
Fuel and Equipment Maintenance	27%	15%
Capital Outlays for Land, Buildings, and Equipment	9%	5%
Snow and Ice Control, Insurance, Other Services and Charges	13%	22%
Total	97%	97%

5.1.2. Local Road and Street Funds

LRS funds are distributed in a similar way to MVH funds, but may be used only for specific types of expenses permitted by IC 8-14-2 (Indiana Code, 2008). Most agencies dedicate the LRS funds entirely to the maintenance and reconstruction of their roads and streets, although there are several other legal uses, including purchase of equipment, right of way, and engineering services. Summaries of the revenues and distributions from the LRS fund over the last ten years are shown in Tables 5.5 and 5.6. For FY 07-08, the total LRS funding available to counties, cities and towns was $78.96 million, down from $79.36 million in FY 06-07. Of that $78.96 million, $44.21 million went to counties and $34.75 million went to cities and towns. The LRS funds are typically used to pay for paving materials and other direct expenses.

Table 5.5. LRS Fund Revenues, Last Ten Years				
State FY	Fuel Taxes	Vehicle Taxes & Fees	Other	Total Gross Receipts
07 - 08	$156,653,209	$18,821,081	$0	$175,474,290
06 - 07	$158,191,694	$18,166,550	$0	$176,358,244
05 - 06	$160,217,390	$18,943,909	$0	$179,161,300
04 - 05	$158,984,143	$18,993,217	$0	$177,977,361
03 - 04	$156,367,844	$18,911,637	$0	$175,279,481
02 - 03	$153,297,592	$18,696,043	$0	$171,993,635
01 - 02	$150,510,506	$18,470,004	$0	$168,980,510
00 - 01	$149,657,617	$18,658,469	$99,999,996	$268,316,082
99 - 00	$151,841,536	$18,991,169	$100,000,000	$270,832,705
98 - 99	$144,922,245	$18,047,873	$50,000,004	$212,970,121

Table 5.6. LRS Fund Distributions, Last Ten Years				
State FY	INDOT	Counties	Cities & Towns	Total
07 - 08	$96,511,869	$44,213,191	$34,749,229	$175,474,290
06 - 07	$97,002,265	$45,467,088	$33,888,892	$176,358,244
05 - 06	$98,495,622	$46,217,480	$34,448,197	$179,161,299
04 - 05	$97,934,394	$45,860,697	$34,182,268	$177,977,359
03 - 04	$95,578,052	$45,596,865	$34,104,564	$175,279,481
02 - 03	$94,649,077	$44,394,577	$32,949,981	$171,993,635
01 - 02	$92,935,018	$42,910,950	$33,134,542	$168,980,510
00 - 01	$92,567,084	$99,171,699	$76,577,307	$268,316,090
99 - 00	$93,951,481	$100,358,869	$76,522,355	$270,832,705
98 - 99	$89,639,483	$69,974,865	$53,355,773	$212,970,121

5.1.3. Local Supplemental Funding

Local agencies supplement their MVH and LRS funds in a wide variety of ways. The supplemental funding options are illustrated in Table 5.7, which shows data for all counties based on the County Annual Operational Reports. The table also shows the number of counties that utilize each source of supplemental funding, and the total amount of supplemental funding that is collected and dedicated to county roads.

Table 5.7. Supplemental Funding for Counties (CY 2006)		
Number of Counties	Type of Supplemental Funding	Amount
25	County Option Income Taxes (COIT, CEDIT, and CAGIT[1])	$34,778,400
45	Local Option Vehicle Taxes (wheel/surtax, and/or buggy taxes)	$56,972,567
57	Other County Taxes (General, Capital Development, TIF, etc.)	$8,998,721
34	Permits and Fees	$4,799,745
7	Gaming Funds from Riverboats	$19,459,077
79	Other Funds[2]	$9,236,813
89	Total	$134,245,323

[1] COIT: County Option Income Tax, CEDIT: County Economic Development Income Tax, CAGIT: County Adjusted Gross Income Tax.

[2] Other funds include reimbursement for bridge inspection, revenue from auctions/surplus/junk sales, landfill use fee, interest on investments, cost sharing programs, grant funds, and donations.

The total amount of supplemental funding for counties is over $134 million for calendar year (CY) 2006, the most recent year for which data is compiled for all counties. Supplemental funds are reported for CY rather than FY. While supplemental funds can have a significant impact on an LPA's budget, the availability varies widely by county and in some cases these funds have restrictions on use. For example, one of the reported sources of supplemental revenue is gaming funds from the riverboats; $19 million was received by counties from these sources, however, they are not an option for most counties in the state. Another source of supplemental funds is revenue from tax increment finance (TIF) districts. These TIF funds, which accounted for over $3 million in 2006, can only be used for improvements within the TIF district, and cannot be used for maintenance throughout the county, city or town. Detailed supplemental revenues for the eight counties in the sample are shown in the Table 5.8; supplemental revenues for the remaining counties are shown in Table 5.9.

Cities also use a variety of supplemental funding sources to supplement the MVH and LRS funds. Supplemental funding sources used by cities are often analogous to those used by counties and include gaming funds, the economic development income tax (EDIT), the commercial vehicle excise tax (CVET), municipal option income taxes, capital development funds, TIF districts, and general funds. As shown in Table 5.10, municipal supplemental funds dedicated to transportation uses totaled over $113 million in CY 2006 for the cities and towns shown with a population over 20,000 people. Gaming funds resulted in 35 percent of the total revenue (the largest single source), however, these gaming funds benefitted only 8 of the 37 cities.

There are two major points regarding supplemental funding. The first point is that local agencies have made an increasing effort to leverage resources at their own disposal before approaching state officials. For example, the number of counties that have a wheel tax has more than doubled, increasing from 20 as reported in 2001 to 45 counties in CY 2006. The number of counties using other county taxes (such as general, capital development and TIF) funds for transportation has increased from 21 as reported in 2001 to 57 in CY 2006. Considering all local agencies, 89 percent of the municipalities reporting and 97 percent of the counties have some level of supplemental funding.

The second point is that the potential revenue from supplemental funds varies widely from agency to agency. The disparity in supplemental funding is illustrated by the fact that for the counties, 44 percent of the supplemental funds are distributed among five of the 92 counties in Indiana. The disparity is even more pronounced for the municipalities, with 76 percent of the supplemental funds distributed among only five cities and towns. Generally, wealthier and more populated counties may be able to leverage more money from local income and vehicle taxes than counties that are rural, even though rural counties may have more miles of roads to maintain. Similarly, wealthier and growing municipalities have an increased opportunity to raise funds through income taxes and TIF districts, although the needs of older, lower income municipalities may be just as great. Furthermore, some supplemental funds are not available to all counties, for example, riverboat proceeds are only available to the handful of cities and counties that host these boats. While supplemental funding sources are useful, supplemental funds are inadequate to address the bulk of the funding required to maintain the road system.

Table 5.8. Supplemental Funds for Sample Counties (CY 2006)

County	CEDIT[1]	COIT[2]	LOHUT[3]	Non-Moter Vehicle	Permits[4]	Boat Money[5]	Misc County Taxes[6]	Other Funds[7]	Total
Adams				$70,115	$1,400		$7,241	$77,912	$156,668
Fayette			$563,159					$1,989	$565,148
Floyd	$192,000					$162,850		$95,426	$450,276
Fountain			$293,405					$59,858	$353,263
Hamilton		$5,389,300			$77,367		$3,532,396[8]	$833,618	$9,832,681[8]
Lawrence			$1,124,058						$1,124,058
Pike	$450,000						$3,663	$26,165	$479,828
White					$7,353		$11,648	$30,464	$49,465

[1] CEDIT: County Economic Development Income Tax.
[2] COIT: County Option Income Tax.
[3] LOHUT: Local Option Highway User Tax (wheel tax & excise surtax).
[4] Permits: Permits include road cuts, underground & driveway permits & right of way permits. White County value is for proceeds from Cable Franchise Fund.
[5] Boat Money: A portion of River Boat gambling revenues have been set aside for the listed counties to be applied toward infrastructure improvements.
[6] Misc County Taxes: includes capital development fund, tax increment financing (TIF), commercial vehicle excise tax (CVET), and financial institution tax.
[7] Other funds include reimbursement for bridge inspection, revenue from auctions/surplus/junk sales, landfill use fee, interest on investments, cost sharing programs, grant funds, and donations.
[8] TIF backed bonds reflect funds utilized over an assumed ten-year period.

Table 5.9. Supplemental Funds for All Counties (CY 2006)

County	Total Supplemental Revenue	County	Total Supplemental Revenue	County	Total Supplemental Revenue
Adams	$156,668	Hendricks	$2,632,376	Pike	$479,828
Allen	$12,639,320	Henry	$1,194,386	Porter	$1,499,830
Bartholomew	$107,048	Howard	$1,569,151	Posey	$577,345
Benton	$119,328	Huntington	$92,538	Pulaski	$30,023
Blackford	$111,265	Jackson	$108,840	Putnam	$926,870
Boone	$438,257	Jasper	$82,674	Randolph	$704,593
Brown	$274,020	Jay	$427,071	Ripley	$858,680
Carroll	$549,366	Jefferson	$287,817	Rush	$472,805
Cass	$61,765	Jennings	$0	Scott	$17,958
Clark	$1,038,597	Johnson	$73,910	Shelby	$120,559
Clay	$68,250	Knox	$201,757	Spencer	$4,918
Clinton	$486,218	Kosciusko	$153,749	St. Joseph	$5,622,689
Crawford	$1,044,887	LaGrange	$748,670	Starke	$650,014
Daviess	$424,212	Lake	$0	Steuben	$276,936
Dearborn	$4,305,068	LaPorte	$3,862,216	Sullivan	$1,090,319
Decatur	$559,409	Lawrence	$1,124,058	Switzerland	$0
Dekalb	$51,944	Madison	$94,806	Tippecanoe	$3,122,842
Delaware	$323,062	Marion	$17,782,138	Tipton	$708,869
Dubois	$914,803	Marshall	$22,872	Union	$87,040
Elkhart	$10,197,453	Martin	$267,816	Vanderburgh	$2,402,541
Fayette	$565,148	Miami	$85,374	Vermillion	$223,025
Floyd	$450,276	Monroe	$4,434,062	Vigo	$1,360,510
Fountain	$353,263	Montgomery	$649,106	Wabash	$138,515
Franklin	$854,318	Morgan	$1,197,553	Warren	$524,255
Fulton	$181,778	Newton	$88,775	Warrick	$3,087,740
Gibson	$665,968	Noble	$748,749	Washington	$1,408,109
Grant	$140,141	Ohio	$4,686,382	Wayne	$4,583,971
Greene	$871,365	Orange	$381,776	Wells	$2,828
Hamilton	$9,832,681	Owen	$319,232	White	$49,465
Hancock	$1,870,818	Parke	$398,682	Whitley	$622,684
Harrison	$8,382,626	Perry	$833,700		
				Total	$134,245,323

Table 5.10. Supplemental Funds for Cities and Towns over 20,000[1] (CY 2006)			
Municipality	**Total Supplemental Revenue**	**Municipality**	**Total Supplemental Revenue**
Anderson	$0	Lafayette	$788,592
Bloomington	$923,959	Laporte	$465,512
Carmel	$5,510,583	Lawrence	$635,721
Clarksville	$207,029	Marion	$0
Columbus	$320,819	Merrillville	$439,492
East Chicago	$2,080,342	Michigan City	$26,634,606
Elkhart	$130,850	Mishawaka	$1,620,564
Evansville	$2,274,038	Muncie	$47,284
Fishers	$0	Munster	$317,587
Fort Wayne	$12,769,748	New Albany	$983,608
Gary	$0	Noblesville	$121,270
Goshen	$2,140,975	Portage	$245,595
Greenwood	$22,602	Richmond	$46,224
Hammond	$24,235,056	Schererville	$2,634,734
Highland	$364,076	South Bend	$1,914,336
Hobart	$2,587	Terre Haute	$572,439
Indianapolis	$58,845	Valparaiso	$10,773,610
Jeffersonville	$277,677	West Lafayette	$11,903,782
Kokomo	$2,065,234		
		Total[2]	$113,529,375

[1] Population over 20,000
[2] Note: The total shown does not equal the sum of the individual values due to rounding.

5.1.4. Bridges and Culverts

Most local bridges in Indiana are maintained and replaced using county cumulative bridge funds, major bridge funds, and federal aid. In almost all cases, counties maintain all local bridges. Some counties use additional funds such as cumulative capital development, CEDIT, and county general funds to help maintain their bridges. Similarly, a few larger counties sell bonds for large bridge projects, although this is not practical for smaller counties. Though alternative revenue sources do exist, they do not represent the bulk of bridge funding for local bridges.

5.1.4.1. Cumulative Bridge Funds

County cumulative bridge funds are most commonly used to fund new structures, and are a primary source of funds for bridge maintenance and repair. A recent Indiana LTAP publication reports that 86 of 92 counties utilized the cumulative bridge fund as their primary source of funds for bridge repair and replacement (Indiana, 2008). The county cumulative bridge fund is a property tax based fund, with a statutory maximum rate of $0.10 per $100.00 assessed valuation.

Cumulative bridge funds in Indiana generated approximately $53.4 million in CY 2007, by far the biggest single source of bridge funding available. One of the problems with the cumulative bridge fund is that it is not very effective in raising revenue in large rural counties. Cumulative bridge fund revenues are greater in smaller, more developed counties because revenues are generated in proportion to the net assessed value of the property in the county. As Table 5.11 shows, bridge funding on a per bridge basis varies widely from a low of $839 per year per bridge in Rush County, to as high as $15,857 per year per bridge in Lake County. The counties listed in Table 5.11 were selected to illustrate the wide range of funding per bridge from county to county.

Counties are allowed to use cumulative bridge funds for several purposes, including construction and maintenance of small structures and culverts, as well as personnel, equipment, and supplies for work performed by county forces. An analysis of the County Highway Operational Reports (Indiana State Board of Accounts, 2006/2007) indicates that these other uses consume nearly 25 percent of the bridge funds, leaving only 75 percent available for the maintenance and replacement of county bridges.

Table 5.11. Cumulative Bridge Funding for Selected Counties (CY 2007)					
County	Number of Bridges	Rate	Assessed Value	Levy	Funding per Bridge
Lake	172	$0.0118 / $100.00	$23,208,219,994	$2,727,358	$15,857 per bridge
Lawrence	130	$0.0584 / $100.00	$1,400,792,281	$818,063	$6,293 per bridge
Floyd	83	$0.0133 / $100.00	$3,476,822,305	$462,417	$5,571 per bridge
Adams	158	$0.0506 / $100.00	$1,409,478,440	$713,196	$4,514 per bridge
Fayette	85	$0.0430 / $100.00	$854,121,160	$367,272	$4,321 per bridge
Gibson	252	$0.0687 / $100.00	$1,503,465,862	$1,032,881	$4,099 per bridge
Fountain	142	$0.0590 / $100.00	$692,674,310	$408,678	$2,878 per bridge
Pike	110	$0.0500 / $100.00	$602,392,978	$301,196	$2,738 per bridge
Rush	193	$0.0207 / $100.00	$782,639,812	$162,006	$839 per bridge
86 County Average	140	$0.0331 / $100.00	$2,553,987,015	$621,231	$4,552 per bridge

5.1.4.2. Major Bridge Funds

Five counties in Indiana have been allowed to enact local legislation establishing a major bridge fund, based on factors such county population, bridge length and need as described in IC 8-16-3.1 (Indiana Code, 2008). Indiana code contains very specific requirements which limit this fund to selected bridges. Based on the criteria and a review of the existing bridge inventory data, it is estimated that less than 100 bridges (less than one percent of the statewide total) qualify for major bridge funding in the five enacting counties. Approximately $10 million is available through the major bridge fund for bridge construction and maintenance.

5.1.4.3. Federal Aid Bridge Funds

Federal aid bridge funds have traditionally been shared between the state and the counties based on a 65/35 percent split. This split meets the federal requirement that a minimum of 15 percent and a maximum of 35 percent of the federal aid bridge funds are spent on "off system" bridges. All "off system" bridges are located on the county system, but not all county bridges are "off system." For federal FY 05-06, the county share of federal aid bridge funds was approximately $23.9 million. For federal FY 06-07, that amount slightly increased to approximately $25.9 million.

5.2. Estimated Funding Required

The following sections estimate the funding requirements for county roads, city and town streets, bridges and culverts, and safety improvements. Funding estimates include the short- and long-term funding needs. Short-term funding is needed to address deficiencies and is based on a condition assessment. Long-term funding is needed to provide a maintenance program to address normal deterioration and preserve the transportation infrastructure.

5.2.1. County Roads

The funding required for maintaining the 66,150 mile system of county roads was estimated by evaluating the paved and unpaved roads as separate systems. Results of the road condition survey indicate that approximately one-half of the paved roads have deteriorated to the point that a normal maintenance program is inadequate. Therefore, estimates are provided to address the short-term need to upgrade the system to an adequate base line, so standard maintenance practices can be used to address normal deterioration.

For paved roads, short-term costs reflect the need for road resurfacing, in this case a functional overlay to improve the road surface. Long-term costs reflect periodic resurfacing as well as the need for regular maintenance (single chip seal). Minor maintenance such as pothole repair is assumed to be paid from MVH funds. Cost estimates were based on cost surveys in Indiana, as well as cost estimates published by FHWA (Skorseth and Selim, 2005). The cost of a functional overlay used in this report reflects the average of a hot-mix asphalt (HMA) overlay and a cold mix asphalt overlay, either of these materials may be used to resurface a county road. This cost assumption is consistent with the 2001 report (Indiana LTAP, 2001). For illustration purposes, the resurfacing and maintenance program outlined in this report is based on use of asphalt concrete, which is commonly used for county roads; another common material used for roads in Indiana is Portland cement concrete (PCC).

The proposed program estimates costs using a functional overlay appropriate for a rural county road; this is a low cost program to keep low volume roads in adequate condition. Counties with wider roads (e.g., two full 12 foot lanes or more) that carry higher volumes of traffic would likely incur higher costs for pavement management.

5.2.1.1. Short-term Need

For paved roads, the short-term need was estimated based on the results of the road condition survey. Improvement is recommended for 51 percent of the roads, which reflects the roads with a PASER condition rating of four or less, the threshold at which improvement is warranted. The estimated percent of roads requiring improvement is substantiated by the IRI data, which indicates that almost half of the roads have an IRI over 200 inches/mile.

Ideally, roads with a PASER rating of four or less would be substantially upgraded through projects that include structural improvement to both the pavement and the underlying layers; however, often counties use a functional overlay as a lower cost alternative to improve service. In this study, the cost of a functional overlay is used to estimate funding requirements, which reflects the standard practice in many counties, given fiscal constraints.

Extrapolating the survey results to the statewide level for all county roads, it is estimated that 25,302 miles of paved county roads have a PASER rating of four or less, and are recommended for improvement. Based on a cost of $76,000 per mile, it is estimated that $1.923 billion is required to improve these county roads.

Since the road condition survey only included paved roads, the short-term need for unpaved roads is estimated assuming that the same percentage of unpaved roads need improvement (51 percent). The cost to resurface a mile of county road is estimated to be $4,600 per mile for materials only (Skorseth and Selim, 2005); this cost does not include labor and equipment, which are assumed to be paid for using MVH funds. It is estimated that $39 million is required to address the short-term needs of the estimated 8,434 miles of unpaved road requiring improvements.

The total short-term need for county roads is $1.962 billion, based on $1.923 million for paved roads and $39 million for unpaved roads.

5.2.1.2. Long-term Need

For paved roads, the funding required is estimated based on the maintenance cycles and costs shown in Table 5.12. The pavement management program is developed around a 12 year program, with chip seal surface treatments at years four and eight and a functional overlay at year twelve. The resulting program has an average maintenance chip seal interval of six years and a functional overlay interval of twelve years. This program was presented in the 2001 report and was maintained after discussion with industry experts. For the nearly 50,000 miles of paved county roads, $413 million per year is required to maintain the proposed program. This is equivalent to $8,333 per mile per year.

As can be seen in Table 5.12, the current funding available for paving activities is $44 million annually (assuming all of the LRS distribution is dedicated to paved roads). This funding is dramatically less than the $413 million required annually for implementation of the proposed maintenance program. Due to this discrepancy, the funds currently available for paved county roads cannot fund the entire paved county road network on the proposed maintenance schedule. Conceptually, there are two ways that the limited funding can be used to maintain the road network.

- The funds available can be targeted to maintain a portion of the road system on the proposed maintenance program. If this strategy is used, 5,306 miles of county road can be maintained in good condition using the proposed maintenance program. This represents 10 percent of the paved county road network; there would be no funding available for the remaining 90 percent of the roads, which would subsequently be completely neglected.

- The funds available can be used to maintain all the roads, however, the proposed maintenance program will have to be modified. If this strategy is used, instead of resurfacing a paved road every 12 years, each road will be resurfaced every 122 years. This represents a more than tenfold extension of the maintenance cycle, and would obviously leave all roads in dire condition.

Table 5.12. County Road Maintenance Funding Requirements

Item	Interval or Cost
Total County Road Mileage, miles	66,150
Total Paved County Road Mileage, miles	49,612
Maintenance Interval (chip seal), years	6
Maintenance Cost, $ per mile	$12,000
Resurfacing Interval (functional overlay), years	12
Resurfacing Cost, $ per mile	$76,000
2007 Funding Available (per State Auditor formula)	$44,213,191
Costs and Production Required to Maintain Desired Program	
Annual Cost per Mile	$8,333
Annual Program for Sealing, miles per year	8,269
Annual Program for Resurfacing, miles per year	4,134
System Cost for Paving and Sealing	$413,433,333
Annual Shortfall	$369,220,142
Program Possible with given Mileage, Budget, and Costs	
Sealing Interval, years	56
Resurfacing Interval, years	122
Mileage Possible with Existing Budget and Desired Program	
Miles	5,306

Obviously, neither of the two strategies outlined above is satisfactory, however each strategy illustrates the challenges that local agencies currently face when trying to maintain their road system with the funds that are currently available. Unpaved roads still constitute a significant portion of the county roads in Indiana, about 25 percent according to road inventory data included in the County Highway Operational Reports. Maintenance costs for material only are estimated to be $1,900 per mile per year (Skorseth and Selim, 2005). The resulting annual cost to maintain the 16,537 miles of unpaved road is $31 million. To illustrate the deficiency in funding, fully maintaining county unpaved roads per guidelines published in a FHWA report (Skorseth and Selim, 2005) would consume approximately 70 percent of the LRS funds for counties in FY 07-08.

The total long-term need for county roads is $444 million, based on $413 million for paved roads and $31 million for unpaved roads.

5.2.2. City and Town Streets

The funding required for upgrading and maintaining the 18,133 mile system of streets in cities and towns was estimated based on the funding needs for the county, and the distribution formula for the LRS funding. It is assumed that the needs for cities and towns are analogous to the needs for counties and proportional based on the current LRS formula. This methodology for estimating the need for cities and towns based on the LRS distribution formula was presented in the 2001 report, and is appropriate for planning level estimates. This methodology may result in a conservative estimate; because research suggests that urban area facilities are significantly more expensive than rural facilities (Sinha, et al, 2005).

5.2.2.1. Short-term Need

The short-term need for counties was estimated to be $1.962 billion; this represents 56 percent of the total local need, based on the LRS distribution formula. The total estimated need for all local agencies is therefore $3.504 billion. According to the distribution formula, the need for cities and towns is $1.542 billion.

5.2.2.2. Long-term Need

The long-term need for counties was estimated in the previous section as $444 million for paved and unpaved roads; this value represents 56 percent of the total local need, based on the distribution formula. The total need for all local agencies is estimated to be $794 million, assuming the county need of $444 million represents 56 percent of the total local need. The need for cities and towns is estimated to be $350 million, which represents 44 percent of the total local need of $794 million.

5.2.3. Bridges and Culverts

The funding needs for bridges are based on the bridge conditions identified in the current NBIS database and the bridge replacement costs reported in a survey of county highway departments in 2005 that included cost data for all bridges constructed after 1997. The results of the survey were adjusted using the consumer price index (CPI) inflation calculator provided by the Bureau of Labor Statistics (Bureau of Labor Statistics, *CPI Inflation Calculator*). Existing bridges longer than 125 feet were assumed to be replaced using federal aid, while bridges shorter than 125 feet were assumed to be replaced using local funds.

Cost estimates are based on average bridge costs per square foot and the estimated bridge size. The replacement bridge lengths were estimated using expansions factors, and the projected bridge widths were estimated as a function of ADT. Both of these procedures were developed based on the responses to the 2005 survey.

5.2.3.1. Short-term Need

The calculation of the short-term funding required to upgrade the county bridge system is based on the Highway Bridge Replacement and Rehabilitation Program local selection list. Bridges are eligible for replacement when they are classified as deficient and have a sufficiency rating less than 50. In addition, the bridge cannot have been rehabilitated, reconstructed, or replaced within

the last ten years. Bridges are eligible for rehabilitation when they are classified as deficient and have a sufficiency rating less than 80 but greater than 50.

The cost of upgrading the system to an acceptable level is estimated based on the number of backlog projects that must be finished in order to get the bridge program on the proposed rehabilitation and replacement schedule. Under the proposed bridge program, approximately 1.4% of the bridges in the inventory should be replaced and rehabilitated in a given year. According to the NBIS data, there are currently 1,446 county bridges that meet these criteria for replacement and 1,416 county bridges that meet these criteria for rehabilitation. The short-term funding needs reflects replacement or rehabilitation of these 2,862 bridges.

Estimating the cost for bridge replacement requires estimation of the size of the replacement bridge as well as the number of bridges. The bridge length is determined based on the average bridge length in Indiana bridge replacement database of 1,446 county bridges, multiplied by a bridge expansion factor; new bridges are generally larger than the bridges they replace. Expansion factors of 1.5 and 1.2 were calculated for locally and federally funded bridges, respectively. Similarly, the width of the replacement bridge was assumed to increase by 10 feet for locally funded bridges and 15 feet for federally funded bridges. The bridge width is based on the average ADT in the bridge database. The resulting bridge deck dimensions were used, along with average bridge costs of $175 per square foot for locally funded and $192 per square foot for federally funded bridges. The result is a short-term need of approximately $786 million.

Bridge rehabilitation unit costs were assumed to be approximately 28 percent of the replacement unit costs (Sinha et al, 2005). Average bridge areas were calculated based on the 1,416 bridges in the rehabilitation database and rehabilitation costs were estimated based on existing conditions; bridge rehabilitation did not include any expansion factors or increased widths for the bridge deck. The average bridge cost was estimated to be $49 per square foot and $54 per square foot for locally and federally funded bridges, resulting in a short-term need of approximately $176 million.

Funds are also required for the thousands of smaller bridges and culverts. Local inventory of these structures is not required, so it is difficult to estimate the number and condition of culverts and small structures. Estimates on the number of culverts throughout Indiana were based on the detailed inventory provided by two county highway departments. The culverts in the these sample counties were separated by material (concrete or galvanized steel) and then divided into small culverts, cross-sectional area less than 12 square feet, and large culverts, cross-sectional area greater than or equal to 12 square feet. Average replacement costs per linear foot were estimated based on INDOT concrete pricing and galvanized steel pricing obtained from local highway departments. Small and large galvanized steel culverts were estimated at $40 and $115 per linear foot, respectively. Small and large concrete culverts were estimated at $600 and $1,130 per linear foot, respectively. These costs were used along with the estimated culvert inventory to predict the total value of all culverts and small structures in Indiana. The short-term need for these structures was estimated as a fraction of the short-term need for bridges based on the ratio of total value of the small structures inventory to the bridge inventory. The estimated short-term need is approximately $207 million to alleviate current deficiencies in culverts and small bridges across the state.

5.2.3.2. Long-term Need

Long-term costs are based on a proposed 70 year life cycle, which requires the replacement and rehabilitation of 184 bridges each year. Average bridge area of the bridges to be improved and the average ADT used to determine the necessary increase in bridge width were estimated using the entire county bridge inventory. The same expansion factors for bridge length were used as were used for the determination of short-term need, but the bridge widths were increased by 8 feet and 12 feet for locally funded bridges and federally funded bridges, reflecting the fact that the inventory of all bridges has different characteristics than the inventory of bridges currently eligible for rehabilitation and replacement. Both locally funded and federally funded bridges were estimated to cost approximately $174 per square foot, resulting in long-term costs of $120 million per year for bridge replacement.

Rehabilitation costs were based on the current average bridge area and were assumed to be approximately 28 percent of the reconstruction costs (Sinha et al, 2005). The resulting annual bridge rehabilitation cost is $18 million. The total cost for replacement and rehabilitation of county bridges is estimated to be $138 million.

Additional funds must be allocated for the annual replacement of small bridges and culverts. The estimated life of these structures is 25 years for small culverts (the majority are galvanized steel) and 40 years for large culverts (the majority are concrete). The inventory and costs per linear foot identified for short-term needs are also appropriate for determining long-term needs, resulting in long-term cost of $61 million per year for routine replacement.

General maintenance costs for bridges and culverts were estimated as approximately $6.5 and $1.5 million respectively. These were based on maintenance costs per square foot estimated by INDOT. A summary of the costs for bridges and culverts is shown in Table 5.13.

Table 5.13. Bridge and Culvert Funding Requirements

	Short-Term Costs	Long-Term Costs
Bridges		
Replacement	$786,000,000	$120,000,000
Rehabilitation	$176,000,000	$18,000,000
Maintenance	$0	$6,500,000
Total Bridges	$962,000,000	$144,500,000
Culverts		
Replacement	$207,000,000	$61,000,000
Maintenance	$0	$1,500,000
Total Culverts	$207,000,000	$62,500,000
Total	$1,169,000,000	$207,000,000

5.2.4. Traffic Safety

The safety improvements addressed in this report include the need to upgrade traffic signs on local roads to assure adequate visibility and safety, and the need for adequate pavement markings and increased pavement width on county roads. Safety improvements related to pavement markings and additional pavement width are based on the sample of eight county roads; these findings were not extrapolated to cities and towns because the conditions in cities and towns may not be analogous. For example, a county road that is 16 feet wide is recommended for widening in this report, and costs are estimated based on the survey of county roads in the eight county sample. It is not reasonable to extrapolate this to cities and towns. A road that is 16 feet wide is probably less common in a city or town; furthermore, cars travelling on a narrow road in a city or town are probably travelling at lower speeds due to lower municipal speed limits. Similarly, pavement markings are expected to be much more prevalent in cities and towns than in counties. While there may be a need for additional funds for pavement markings and increased widths in cities and towns, this report does not reflect this need.

5.2.4.1. Traffic Signs

Traffic signs provide information to drivers and contribute to transportation safety. Based on an inventory of failed signs, the density of failed signs was calculated (Indiana LTAP, 2006) and used to determine the funds needed in the short-term to address current system deficiencies. Table 5.14 provides a summary of funds needed to meet current sign standards, based on a sign cost of $90, an average cost for a high-intensity sign appropriate for use on a local road. Results indicate that the statewide fiscal impact on counties, cities and towns for the replacement of deficient signs is estimated to be over $6 million for counties, and over $15 million for cities and towns, for a combined total impact of $22 million, as shown in Table 5.14.

Table 5.14. Short-term Funding Needed to Meet Sign Standards for Local Governments

	Failure Rate for Signs	Density of Failed Signs (per mile)	Number of Miles	Estimated Total Cost for Indiana
County	0.34	1.1	66,150	$ 6,548,850
City and Town	0.37	9.5	18,133	$ 15,503,715
Total				$ 22,052,565

Traffic signs degrade over time due to weather and aging material, and the cost of sign replacement is reflected in the estimate of the long-term need. The high intensity signs proposed for installation have a design life of 10 years. The design life, the estimated number of signs in all local jurisdictions (683,138 signs total per Chapter 4) and a cost of $90 per sign was used to estimate the long-term need for traffic signs, which is $6 million per year for counties, cities and towns.

5.2.4.2. Pavement Markings

Mandatory requirements for pavement markings outlined in the MUTCD (FHWA, 2003) are based on traffic volume, which makes an estimation of the need on local roads difficult, due to a lack of current traffic data. Compliance with MUTCD requirements is not the only reason for pavement striping. Pavement striping increases safety (NCHRP, 2004). A reasonable goal outlined in the 2001 report for pavement striping is for 50 percent of all county roads to have centerline striping, and 25 percent to have edgeline striping. The survey of county roads indicates that only 12 percent of county roads have edgelines and only 28 percent of county roads have centerlines. Given these conditions, and an estimated cost of $0.08 per foot for pavement marking, it is estimated that $20 million in additional funding is required for paved county roads statewide. No cost estimates were made for pavement markings in cities and towns due to a lack of adequate data on the current conditions.

5.2.4.3. Pavement Width

The final safety improvement is added width for narrow county roads. Widening narrow roads is a short-term cost, since it is proposed to address a current deficiency. The survey results indicate that 53 percent of county roads are less than 18 feet wide, the minimum recommended by AASHTO (AASHTO, 2004). Extrapolating the findings of this survey to all county roads in the state, approximately 26,294 miles of paved county roads should be widened by an average of 2 feet to meet the minimum recommended width. Assuming widening costs of $26,000 per mile (per costs reported in Indiana), $684 million would be required statewide. There are no long-term costs associated with pavement width. No cost estimates were made for pavement widening in cities and towns due to a lack of adequate data on the current conditions.

5.3. Shortfall of Current Funding

A comparison of the funds available and the funding required to improve and appropriately maintain the system shows that a significant shortfall exists for all of the assets considered. The funds required for the short-term need represents the shortfall in funding, since no dedicated funding has been allocated to meet this backlog. The shortfall for the long-term need represents an annual shortfall and is the difference between the long-term need, as discussed in Section 5.2, and the revenues available, as discussed in Section 5.1. The long-term funding shortfall for roads and streets, bridges and culverts and safety improvements is presented below.

5.3.1. Roads and Streets

The annual funding available and needed to maintain local roads is shown in Table 5.15. As noted previously, MVH funds are used for administrative, personnel and other operating costs and LRS funds provide the major funding for local roads. As shown in Table 5.15, the total unmet long-term need for roads and streets is $715 million per year.

Table 5.15. Long-term Funding Shortfall for Roads and Streets				
	Annual Funds Available LRS	Annual Funds Required		Long-term Annual Shortfall
		Paved	Unpaved	
County	$44 M	$413 M	$31 M	$400 M
Cities and Towns	$35 M	$350 M		$315 M
Total				$715 M

5.3.2. Bridges and Culverts

The annual funding available and needed for bridges and culverts is shown in Table 5.16. Funding sources include the cumulative bridge fund, major bridge fund, and federal aid. The required funding reflects bridge replacement and rehabilitation, culvert replacement, and required maintenance for both bridges and culverts. The resulting long-term shortfall is $117 million per year.

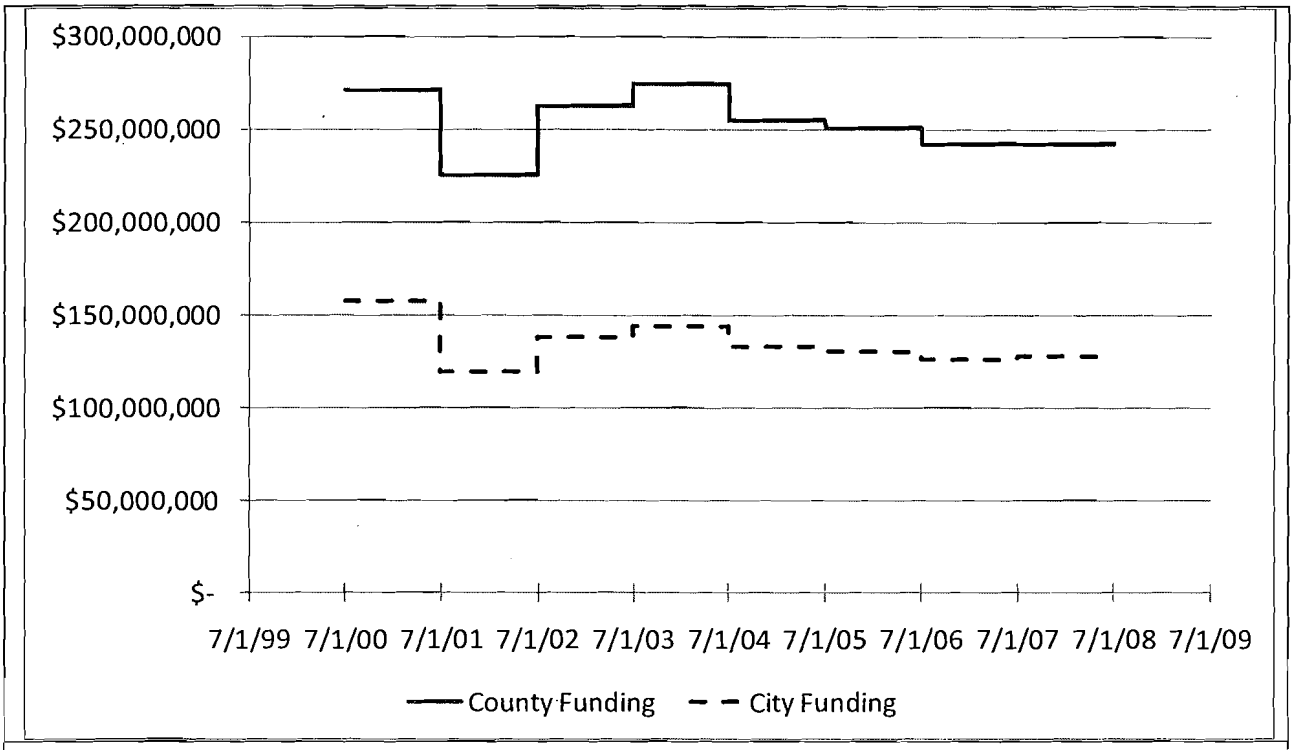
Table 5.16. Long-term Funding Shortfall for Bridges and Culverts					
Annual Funds Available				Annual Funds Required	Long-term Annual Shortfall
Cumulative Bridge	Major Bridge	Federal Aid	Total		
$54 M	$10 M	$26 M	$90 M	$207 M	$117 M

5.3.3. Traffic Safety

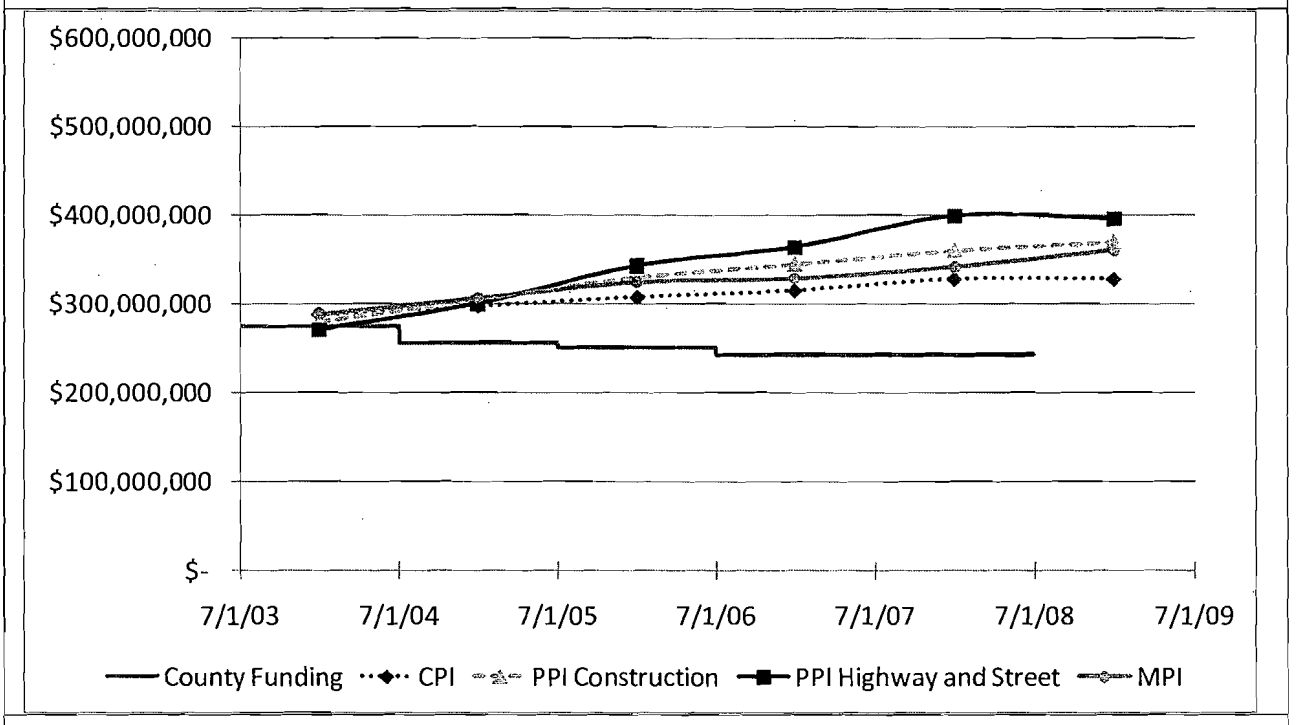
There are currently no state funds dedicated to road safety improvements on an annual basis. The required annual funding represents the long-term shortfall; the long-term shortfall includes funding to replace signs as they degrade over time, with an estimated expense of $6 million, and funding to repaint pavement markings, with an estimated expense of $20 million. There is no long-term funding required for pavement widening. Funding for increased road width is a one-time cost that is quantified in the short-term funding need.

5.3.4. Trends in Transportation Funding

The shortfall in transportation funding for local agencies is due to a number of factors, ranging from expanding transportation systems to decreases in the real value of funding received. The impact of inflation on transportation related expenditures has been dramatic, as illustrated in Figure 5.2. As can be seen in this figure, the expenditures for local agencies has remained relatively constant, while the CPI, the producer price index (PPI) for both construction and



a) Funding for Counties, Cities and Towns in Indiana (MVH and LRS)[1]



b) Funding for Counties Compared to CPI and PPI

Figure 5.2. Trends in Funding and Price Indices

[1] MVH is Motor Vehicle Highway Account, includes Accelerated I and Accelerated II Distributions; LRS is Local Road and Street Account.

highway and street sectors, and the municipal price index (MPI) have generally increased over the last five years.

Funding revenues for local agencies from the MVH funds have been reduced by increased expenses for both the Net State Police Expense and the Bureau of Motor Vehicles Expense, which come directly from the MHV funds. The Net State Police Expense has increased substantially, consuming over $86 million in FY 07-08, compared to over $53 million in FY 04-05 (a 62 percent increase). The Bureau of Motor Vehicles expense has also increased substantially, consuming $50 million in FY 07-08, compared to under $39 million in FY 05-06 (a 29 percent increase).

Funding revenues for local agencies have also diminished due to the reduction in gas tax revenues associated with a decline in vehicle miles traveled and increases in fuel efficiency. Recent projections from the Indiana Auditor of State in December 2008 project decreasing amounts in 2009 for both the MVH and LRS funds. Local agencies may be faced with 2009 revenues that are 5 percent below 2008 revenues, which were less than 2007 revenues. Considering MVH and LRS distributions to locals, revenues in FY 07-08 were 17 percent below revenues in FY 99-00, although costs have increased approximately 29 percent between 1999 and 2008 (Bureau of Labor Statistics, *CPI Inflation Calculator*); adjusting for inflation, funding in FY 07–08 is 36 percent lower than the funding in FY 99-00.

6. Summary and Conclusion

Table 6.1 summarizes the short and long-term funding shortages in each of the main study areas. The total funding shortfall has increased for both the short-term (back log) and the long-term (annual) since the 2001 study.

Table 6.1. Transportation Infrastructure Funding Shortfalls

Component	Short-term (Backlog)	Long-term (Annual)
Roads and Streets		
County Roads		
Paved and Unpaved Roads	$1,962,000,000	$400,000,000 per year
City and Town Streets	$1,542,000,000	$315,000,000 per year
Total Roads and Streets	**$3,504,000,000**	**$715,000,000 per year**
Bridges and Culverts	**$1,169,000,000**	**$117,000,000 per year**
Safety Improvements		
Pavement Markings		
Added Lane Width		
Traffic Sign Replacement		
Total Safety Improvements	**$706,000,000**	**$26,000,000 per year**
Total, 2009	**$5,379,000,000**	**$858,000,000 per year**
Total, 2001	**$2,016,000,000**	**$453,000,000 per year**

6.1. Roads and Streets

Evaluation of current funding capabilities indicates a shortfall for maintenance of the existing local transportation system. For roads and streets, the long-term shortfall is estimated to be $715 million per year. This dramatic shortfall has existed for a number of years, and as a result the road infrastructure has deteriorated and requires improvements so that a normal maintenance program can be implemented. The short-term cost to upgrade the network of local roads and streets is approximately $3.50 billion; this is significantly higher that the estimate in 2001 due to increasing costs and deteriorating conditions. While it may be appropriate to distribute this funding over a period of years, no provision has been made for inflation in the estimated cost. The longer improvements are delayed, the higher the cost will be, due to both aging infrastructure and the impact of inflation.

6.2. Bridges and Culverts

Funding available to maintain bridges and culverts is approximately $117 million per year below the funding needed to maintain the current inventory of bridges and culverts; this represents the long-term annual need. The short-term need is $1.17 billion; these funds are required to address current bridge and culvert deficiencies so that the proposed long-term bridge program can be implemented.

The funding shortfall for bridges in the short-term is higher than it was in 2001, due to increasing costs for bridge reconstruction and rehabilitation. The long-term funding shortfall is lower, due to the proposed use of a more cost effective bridge program which utilizes a rehabilitation component, as well as to the fact that bridge revenues have increased since 2001. Federal funding for bridges has increased by $8 million, and cumulative bridge funds and major bridge funds have each increased by $3 million since 2001.

6.3. Traffic Safety

Currently, local roads are the most hazardous roads for public travel, as indicated by state police statistics which document that more crashes occur on local roads and streets than on state or interstate highways. One way to improve safety was presented over forty years ago by Purdue University Prof. Harold Michael, who suggested that "a program to increase lane width and the use of pavement markings should be undertaken (HERPICC, 1962)." In response to this and more current research (NCHRP, 2004), it is recommended that additional edgeline and centerline markings be used on local roads, with an associated cost of about $20 million per year. This cost is an annual cost because the waterbase paint used by counties has a design life of one year.

Other safety improvements include increasing road width and upgrading traffic signs. Increasing road width would bring roads up to the minimum suggested AASHTO standard of at least 18 feet for low volume, low speed roads (AASHTO, 2004) and would cost at least $684 million. Upgrading traffic signs to meet current MUTCD standards (FHWA, 2003) incurs both a short-term cost of $22 million to address failed signs that are not in compliance, as well as a long-term cost of $6 million to provide ongoing funding to replace signs given a 10-year design life.

6.4. Conclusion

The substantial shortfall of funding reflects increases in costs to maintain the system, decreasing revenues, and continued deterioration due to a lack of proper maintenance. Over the last few years, both MVH and LRS distributions have been decreasing. MVH funds have decreased since FY 04-05, a decrease which has been exacerbated by increasing funds to the State Police and the Bureau of Motor Vehicles. LRS funds have also decreased since FY 05-06. Obviously it is impossible to keep up with increasing expenses when revenues are decreasing.

The provision of a stable and predictable funding source for local roads and bridges is necessary to maintain the integrity of our local transportation network, and to ensure mobility, safety and

an infrastructure that supports the economic needs of the many jurisdictions in Indiana. This report documents the increasing needs and decreasing revenues, and highlights the consequences of a lack of adequate funding in the last decade. The transportation funding shortfall has resulted in deteriorating conditions, and is evidenced by the $5.4 billion funding needed to address the backlog of needs. To maintain our local road and bridge infrastructure, a dedicated source of $858 million per year in additional funding should be allocated. The estimated funding requirements reflect maintenance of the existing system; they do not reflect additional capacity which may be needed to meet future demand.

Local transportation plays an important role in the lives of Indiana residents. Local roads ensure mobility for all residents, and are a vital part of our state's economy. This report documents the substantial shortfall in available funding to maintain and preserve this critical component of our infrastructure.

7. References

References Cited

American Association of State Highway and Transportation Officials (AASHTO). (2004). *Policy on Geometric Design of Highways and Streets.* AASHTO.

ARIES Crash Database. (2009). Retrieved February 2009, from http://www.crashreports.in.gov/Public/Home.aspx.

Becker, G. (2008, October 23). *Parkway Funding Options to be Explored.* Retrieved October 28, 2008, from IndyStar.com: http://www.indystar.com/apps/pbcs.dll/article?AID=200810230385&template=printart.

Bureau of Labor Statistics. (n.d.). *CPI Inflation Calculator.* Retrieved 2008, from http://www.bls.gov/data/inflation_calculator.htm.

Davis, B. J. (2009). Director, Hamilton County Highway Department.

Drumm, R. O. (2009). Safety Engineer, FHWA Indiana Division.

Dunker, K., and Rabbat, B. (1995). Assessing Infrastructure Deficiencies: The Case of Highway Bridges. *ASCE Journal of Infrastructure Systesms.*

Federal Highway Administration (FHWA). (2008). *Indiana Five Percent Report.* Retrieved February 2009, from http://safety.fhwa.dot.gov/fivepercent/08in.htm.

FHWA. (2003). *MUTCD.* Retrieved October 2008, from http://mutcd.fhwa.dot.gov.

FHWA. (n.d.). *Pavement Smoothness Methodologies.* Retrieved March 2009, from http://www.fhwa.dot.gov/crt/lifecycle/pavement.cfm.

FHWA. (n.d.). *Road Safety Fact Sheet.* Retrieved February 19, 2009, from http://safety.fhwa.dot.gov/facts/road_factsheet.htm.

FHWA. (1997). *The Status of the Nation's Highway Bridges: Highway Bridge Replacement and Rehabilitation Program and National Bridge Invtory.* Washington, D.C.: FHWA.

FHWA Office of Engineering, Bridge Division. (1995). *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges.* Washington, D.C.: FHWA.

FHWA Office of Highway Policy Information. (1988). *Our Nation's Highways, Selected Facts and Figures.* Washington, D.C.: FHWA.

Gan, A., Shen, J., and Rodriguez, A. (2005). *Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects.* Florida Department of Transportation.

Google Maps. (2008). Retrieved October 2008 from http://maps.google.com/.

Highway Extension and Research Project for Indiana Counties and Cities (HERPICC). (1962). *An Analysis of Traffic Accidents on County Roads.* HERPICC.

HERPICC. (1965). *Annual Travel on County Highways.* HERPICC.

Illinois Department of Transportation. (2008). *2007 Illinois Crash Facts and Statistics.* Retrieved March 2009, from www.dot.state.il.us/travelstats/07crashfacts.pdf.

Indiana Auditor of State. (2008, December 12), 2009 Revised Budget Revenue Estimates.

Indiana Code. (2008). Retrieved March 2009, from http://www.in.gov/legislative/ic/code/title8/.

Indiana Criminal Justce Institute, Traffic Safety Division. (2008, August). *Indiana Traffic Safety Facts.* Retrieved February 2009, from http://www.in.gov/cji/files/Counties_2008_FINAL.pdf.

Indiana Indiana Local Technical Assistance Program (LTAP). (2006). *Sign Retroreflectivity: Fiscal Impact of Proposed Minimum Retroreflectivity Values on Local Governments in Indiana and Investigation of the Accuracy of Nighttime Inspections.* Indiana LTAP.

Indiana LTAP. (2005). *Indiana County Highway Departments Bridge Replacement Cost Estimation Procedures.* Indiana LTAP.

Indiana LTAP. (2001). *Needs Assessment for Local Roads and Streets.* Indiana LTAP.

Indiana State Board of Accounts. (2006/2007). *Annual Operational Reports Form No. 16.* Indiana State Board of Accounts.

Indiana Department of Transportation. (2007). *2007 Jurisdictional Tabulation of Mileage.* INDOT.

Kentucky Transportation Center. (2008). *2007 Kentucky Traffic Collisions Facts.* Retrieved March 2009, from www.kentuckystatepolice.org/pdf/KY_Traffic_Collisions_Facts_2007.pdf

Michigan Office of Highway Safety Planning. (2008). *2007 Michigan Traffic Crash Facts for County/Communities.* Retrieved from www.michigantrafficcrashfacts.org/

Minnesota Department of Public Safety. (2008, October). *Minnesota Crash Data and Reports.* Retrieved March 2009, from http:/www.dps.state.mn.us/OTS/crashdata/crash facts.asp.

National Archives and Records Administration. (2009). *Title 23 § Subpart C § 650.305 § Definitions.* Retrieved March 2009, from Electronic Code of Federal Regulations: http://ecfr.gpoaccess.gov.

National Center for Pavement Preservation. (n.d.). Retrieved from http://www.pavementpreservation.org/about/background.php.

National Highway and Transportation Safety Administration. (2008, December). *Traffic Safety Facts.* Retrieved February 2009, from http://nhtsa.gov/staticfiles/DOT/NHTSA/NCSA/Content/RNotes/2008/811054.pdf.

National Cooperative Highway Research Program (NCHRP). (2004). *Implementation Guides NCHRP Report 500.* Retrieved March 2009, from http://safety.transportation.org/guides.aspx.

Potts, I., Stutts, J., Pfefer, R., Neuman, T. R., and Hardy, K. (2004). *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan, Volume 9: A Guide for Reducing Collisions Involving Older Drivers NCHRP Report 500.* Washington D.C.: TRB, National Research Council.

Pennsylvania Department of Transportation. (2006). *Ride Quality Definitions, Testing, Analysis and Reporting.* (n.d.). Retrieved September 2008, from Bureau of Maintenance and Operations, Roadway Management, Pennsylvania Department of Transportation: ftp://ftp.dot.state.pa.us/public/Bureaus/BOMO/RM/RITS/IRI-Brochure.pdf.

Sinha, K., Labi, S., Hodge, S., Tine, G., and Shah, H. (2005). *An Assessment of Highway Financing Needs in Indiana.* FHWA/IN/JTRP-2005/9.

Skorseth, K., and Selim, A. (2005). *Gravel Roads, Maintenance and Design Manual Report No. LTAP-02-002.* South Dakota LTAP.

US Census Bureau. (2008). *State and County Quick Facts.* Retrieved July 2008, from http://quickfacts.census.gov/qfd/states/18/18001.html.

Walker, D., Entine, L., and Kummer, S. (2002). *PASER Asphalt Roads Manual.* Transportation Information Center, University of Wisconsin-Madison. Retrieved July 2008 from http://epdfiles.engr.wisc.edu/pdf_web_files/tic/manuals/Asphalt-PASERcontent_02.pdf.

Washington Department of Transportation. (n.d.). *Pavement Management.* Retrieved November 2008, from http://training/ce.washington.edu/WSDOT/Modules/11_pavement_management/11-3_body.htm.

Westfield Community Development. (2008, March). *161st St and Spring Mill Road Special Study and Community Design Gallery Report.* Retrieved October 2008, from http://www.westfield.in.gov/egov/docs/1208278264_716461.pdf.

References Consulted

American Association of State Highway and Transportation Officials (AASHTO). (1993). *AASHTO Guide for Design of Pavement Structures.* AASHTO.

Al-Omari, B. and Darter, M. (1994). Relationships between IRI and PSR. *Transportation Research Record 1435* .

Better Roads Magazine. (2007). 2007 Bridge Inventory. *Better Roads Magazine.*

Indiana Local Technical Assistance Program (LTAP). (2008). *Statewide Bridge Sufficiency Rating Report.* Indiana LTAP.

Indiana LTAP. (2008). *Summary of Highway Revenues, Expenses, and Distributions for Indiana Counties, Cities and Towns.* Indiana LTAP.

Indiana LTAP. (2007). *Summary of Major Moves Money Distributions for Indiana Counties, Cities and Towns.* Indiana LTAP.

Pavement Performance Analysis Workshop. (2009). *Data Analysis Working Group.* Washington D.C.: Transportation Research Board.

Appendix A. Illustrated Examples of County Road Conditions

Illustrations of Conditions on Local Roads in Indiana

This report has provided substantial quantitative documentation of the need for additional investment in the local transportation infrastructure in Indiana. This section provides illustrations of some of the deficiencies described in previous sections. Although anecdotal, the photos shown in the Figures A.1 through A.9 provide a visual appreciation for the situations that could be addressed through adequate transportation funding. Improved road facilities would result in increased efficiency and increased safety on Indiana roads.

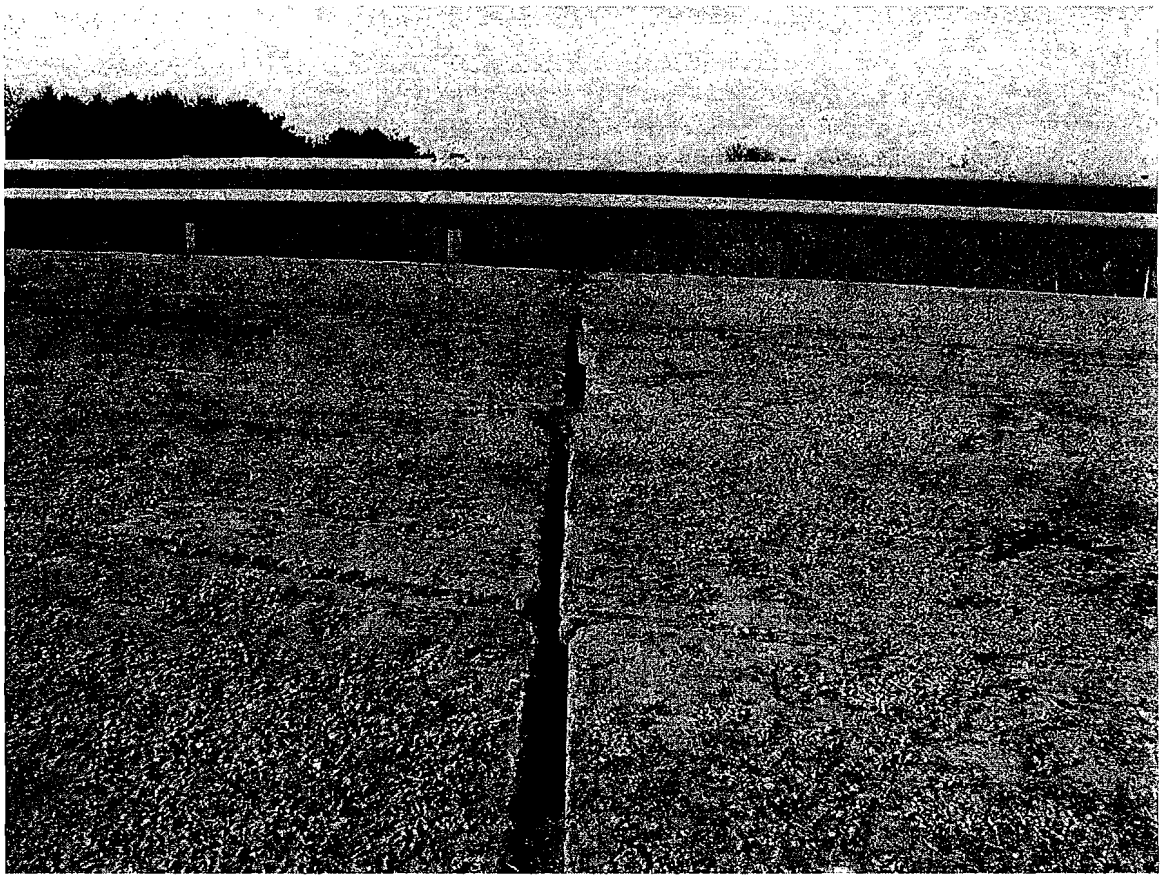


Figure A.1. Bridge on Indiana County Road: Structurally deficient bridge with deck cracking. (ADT = 50)

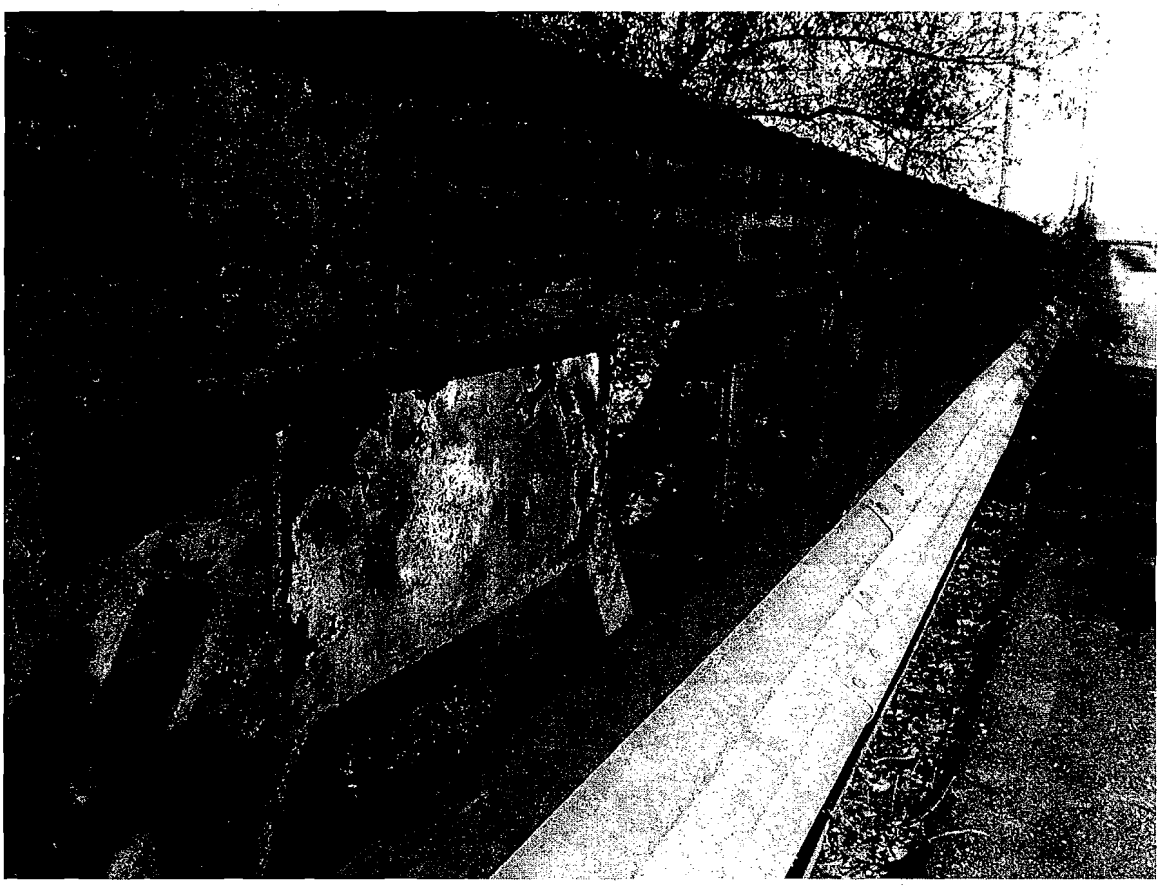


Figure A.2. Bridge on Indiana County Road: Structurally deficient bridge with corroding superstructure. (ADT = 100)

Figure A.3. Bridge on Indiana County Road: Corroding underside of structural deficient bridge. (ADT = 5,000)

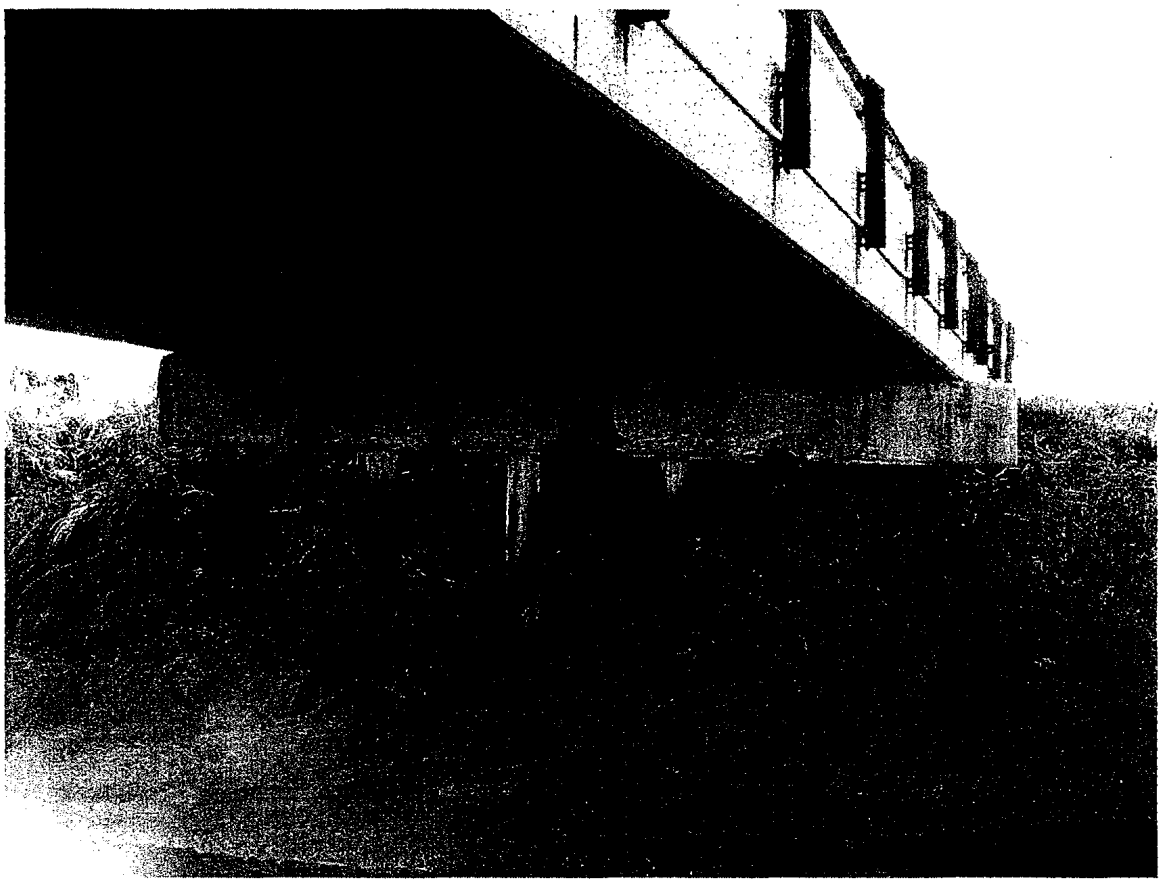


Figure A.4. Bridge on Indiana County Road: Spalled pier cap on a structurally deficient bridge. (ADT = 40)

Figure A. 5. Bridge on Indiana County Road: Spalled concrete and exposed rebar on piers of a structurally deficient bridge. (ADT = 200)

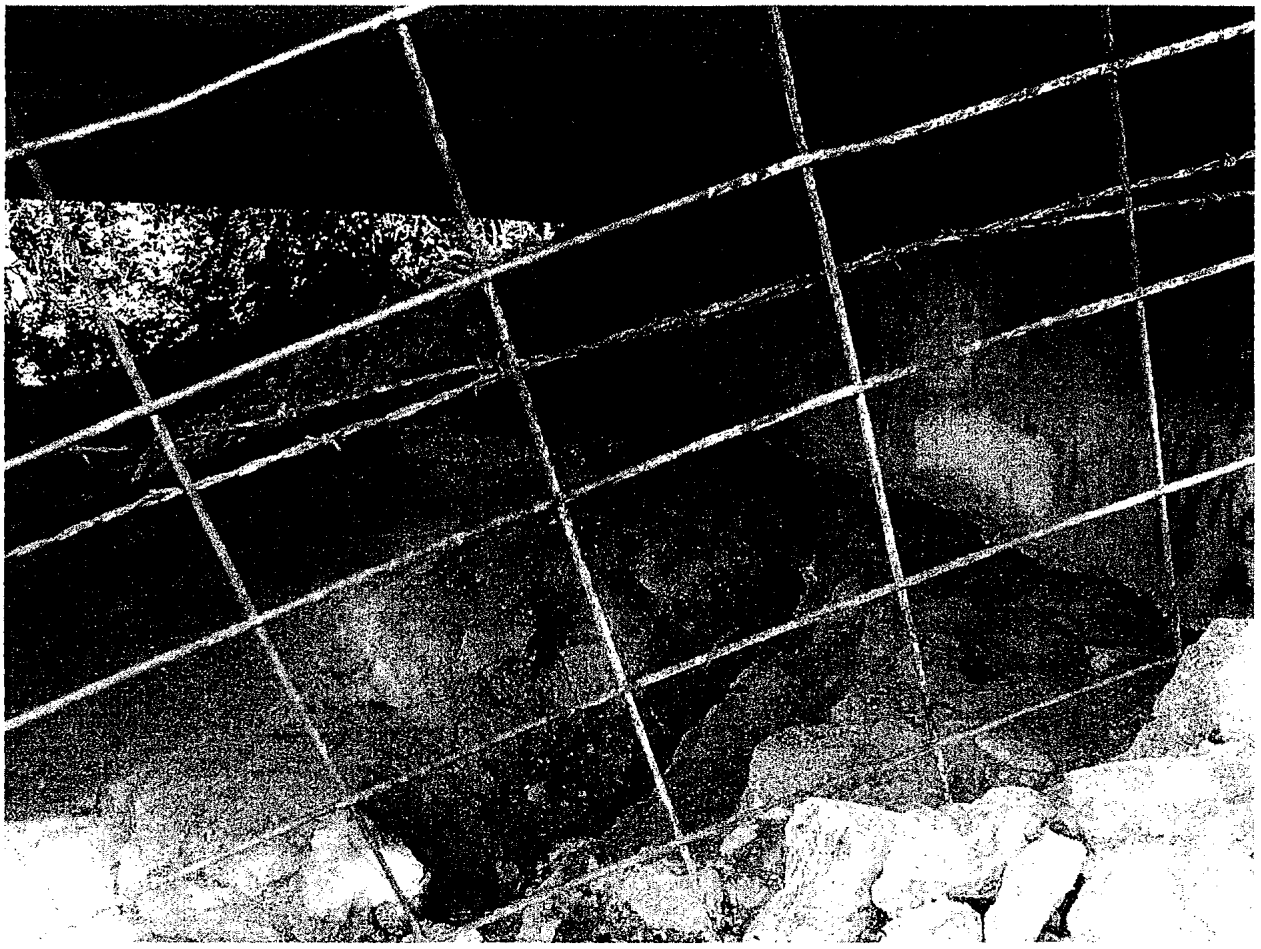


Figure A.6. Bridge on Indiana County Road: Deteriorating earth fill supporting the abutment of a structurally deficient bridge. (ADT = 200)

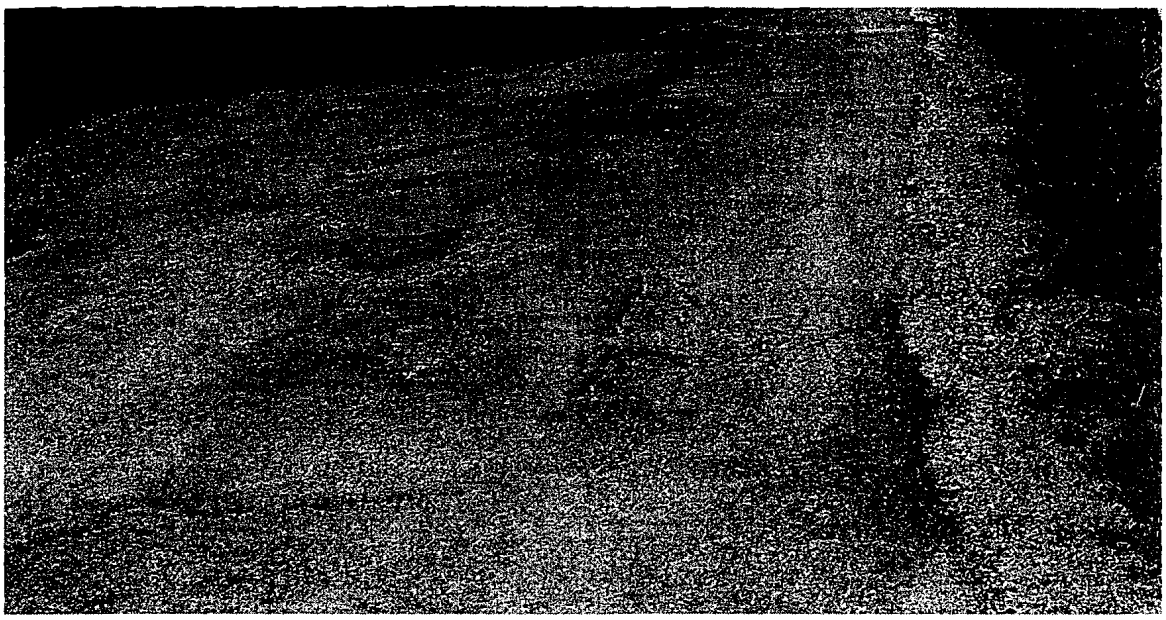
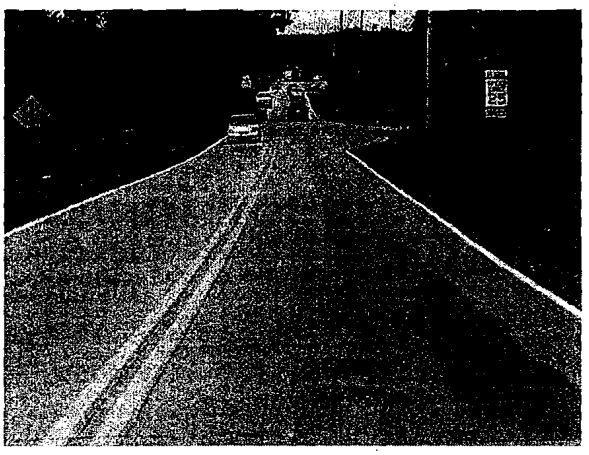


Figure A.7. Indiana County Road: Pavement is uneven, inadequate shoulder, lack of pavement striping.



a) School Zone on County Road with High VMT and No Shoulder

b) High VMT Results in Congestion during Peak Period

c) High Truck Volume in School Zone Exacerbates Need for Adequate Shoulders

Figure A.8. Indiana County Road Serving Large County School

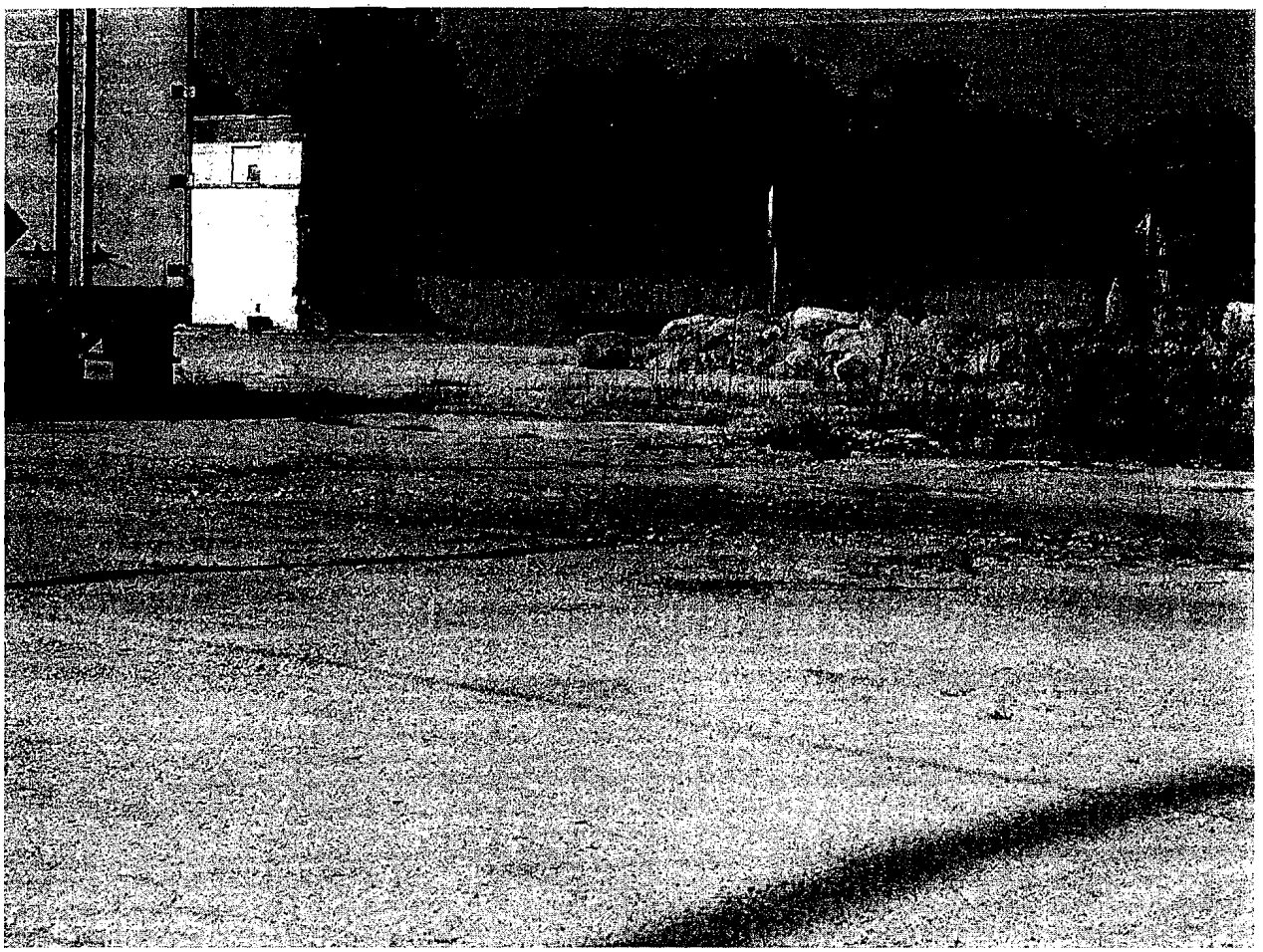


Figure A.9. Indiana County Road: Roads in poor condition do not encourage economic development. This photo illustrates distressed pavement on a county road that formerly served an active manufacturing site. The plant closed and the lot remains vacant. New businesses will choose to locate on facilities that are served by adequate road infrastructure.

Appendix B. Illustrated Examples of PASER Ratings

The PASER rating system was used to evaluate the condition of the paved roads in the eight county sample. The following pages explain the basics of the PASER rating system, and illustrate the basic categories using photos. The following information was excerpted from the "PASER Asphalt Roads Manual," written by Donald Walker, Lynn Entine, and Susan Kummer, published in 2002 by the Transportation Information Center, University of Wisconsin-Madison (published with permission).

Rating system

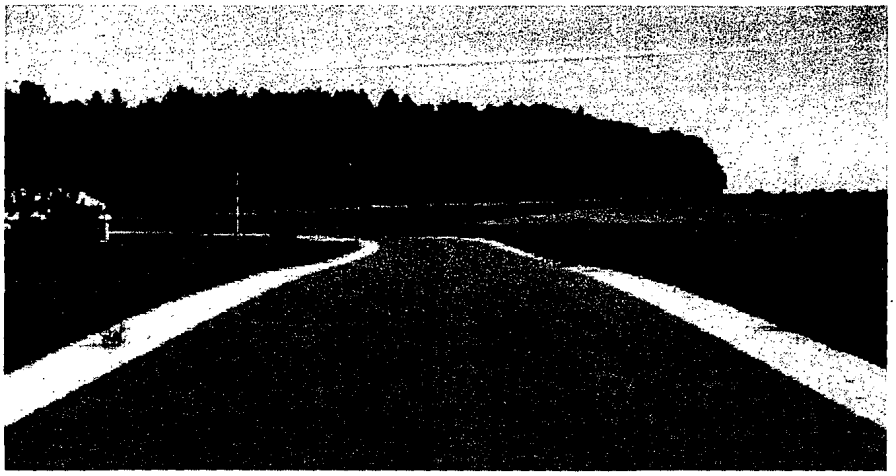
Surface rating	Visible distress*	General condition/ treatment measures
10 Excellent	None.	New construction.
9 Excellent	None.	Recent overlay. Like new.
8 Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40' or greater). All cracks sealed or tight (open less than 1/4").	Recent sealcoat or new cold mix. Little or no maintenance required.
7 Good	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open 1/4") due to reflection or paving joints. Transverse cracks (open 1/4") spaced 10' or more apart, little or slight crack raveling. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6 Good	Slight raveling (loss of fines) and traffic wear. Longitudinal cracks (open 1/4"– 1/2"), some spaced less than 10'. First sign of block cracking. Sight to moderate flushing or polishing. Occasional patching in good condition.	Shows signs of aging. Sound structural condition. Could extend life with sealcoat.
5 Fair	Moderate to severe raveling (loss of fine and coarse aggregate). Longitudinal and transverse cracks (open 1/2") show first signs of slight raveling and secondary cracks. First signs of longitudinal cracks near pavement edge. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging. Sound structural condition. Needs sealcoat or thin non-structural overlay (less than 2")
4 Fair	Severe surface raveling. Multiple longitudinal and transverse cracking with slight raveling. Longitudinal cracking in wheel path. Block cracking (over 50% of surface). Patching in fair condition. Slight rutting or distortions (1/2" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from a structural overlay (2" or more).
3 Poor	Closely spaced longitudinal and transverse cracks often showing raveling and crack erosion. Severe block cracking. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1" or 2" deep). Occasional potholes.	Needs patching and repair prior to major overlay. Milling and removal of deterioration extends the life of overlay.
2 Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2" deep) Extensive patching in poor condition. Potholes.	Severe deterioration. Needs reconstruction with extensive base repair. Pulverization of old pavement is effective.
1 Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

** Individual pavements will not have all of the types of distress listed for any particular rating. They may have only one or two types.*

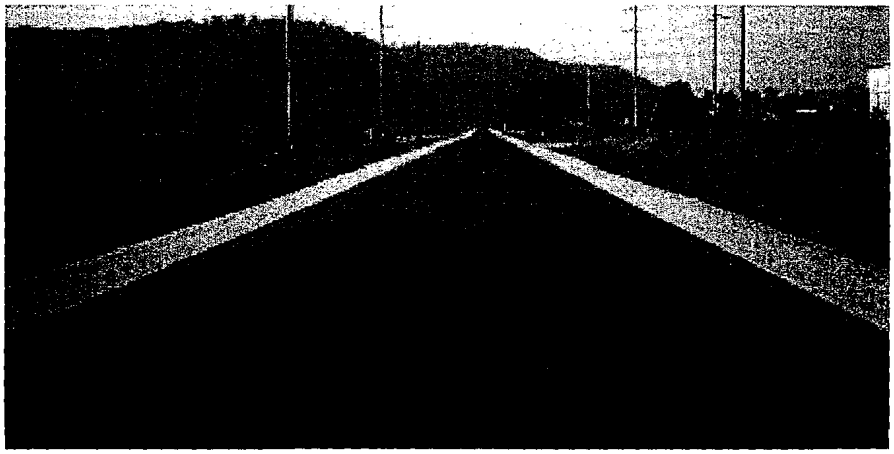
RATING 10 & 9

EXCELLENT —
No maintenance required

Newly constructed or recently overlaid roads are in excellent condition and require no maintenance.



RATING 10
New construction.



RATING 9
Recent overlay, rural.

RATING 9
Recent overlay, urban.

RATING 8

VERY GOOD —
Little or no maintenance required

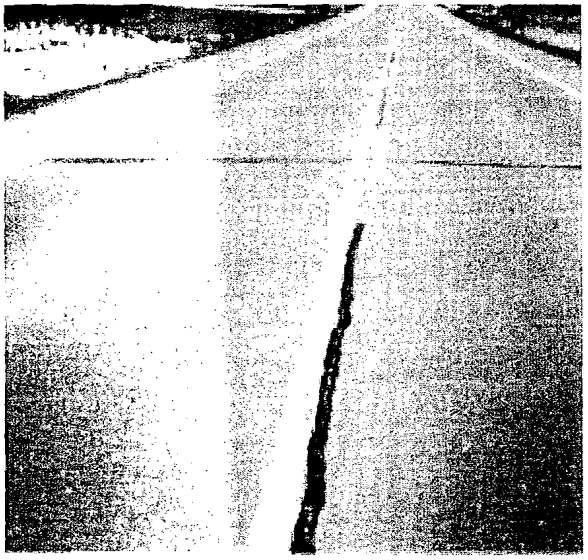
This category includes roads which have been recently sealcoated or overlaid with new cold mix. It also includes recently constructed or overlaid roads which may show longitudinal or transverse cracks. All cracks are tight or sealed.

◄ **Recent chip seal.**

◄ **Recent slurry seal.**

▼ **Widely spaced, sealed cracks.**

▲ **New cold mix surface.**



RATING 7

GOOD —
Routine crack sealing recommended

Roads show first signs of aging, and they may have very slight raveling. Any longitudinal cracks are along paving joint. Transverse cracks may be approximately 10' or more apart. All cracks are 1/4" or less, with little or no crack erosion. Few if any patches, all in very good condition. Maintain a crack sealing program.

Tight and sealed transverse and longitudinal cracks. Maintain crack sealing program.

Tight longitudinal crack and sealed transverse cracks.

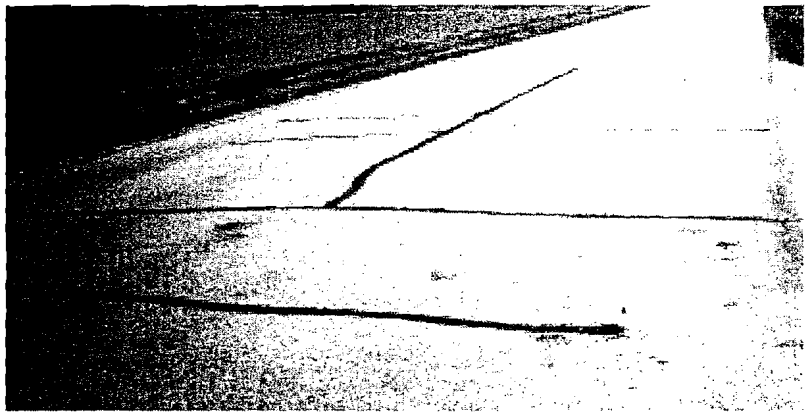
Transverse cracks about 10' or more apart. Maintain crack sealing program.

RATING 6

GOOD —
Consider preservative treatment

Roads are in sound structural condition but show definite signs of aging. Seal-coating could extend their useful life. There may be slight surface raveling. Transverse cracks can be frequent, less than 10′ apart. Cracks may be ¼–½″ and sealed or open. Pavement is generally sound adjacent to cracks. First signs of block cracking may be evident. May have slight or moderate bleeding or polishing. Patches are in good condition.

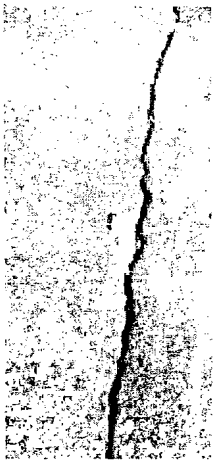
◄ **Slight surface raveling with tight cracks, less than 10′ apart.**



◄ **Transverse cracks less than 10′ apart; cracks well-sealed.**

▼ **Large blocks, early signs of raveling and block cracking.**

▼ **Open crack, ½″ wide; adjoining pavement sound.**



▼ **Moderate flushing.**

RATING 5

FAIR —
Preservative maintenance treatment required

Roads are still in good structural condition but clearly need sealcoating or overlay. They may have moderate to severe surface raveling with significant loss of aggregate. First signs of longitudinal cracks near the edge. First signs of raveling along cracks. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Any patches or edge wedges are in good condition.

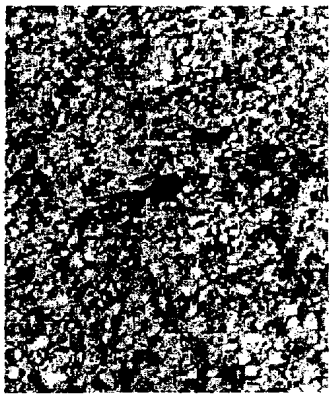
▼ **Block cracking with open cracks.**

► **Moderate to severe raveling in wheel paths.**

▼ **Severe flushing.**

▲ Wedges and patches extensive but in good condition.

Severe raveling with
▼ extreme loss of aggregate.

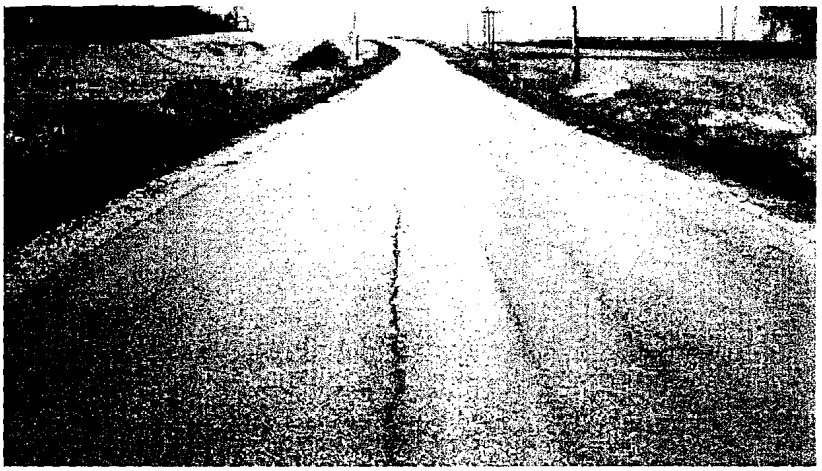


Load cracking and slight
▼ rutting in wheel path.

RATING 4

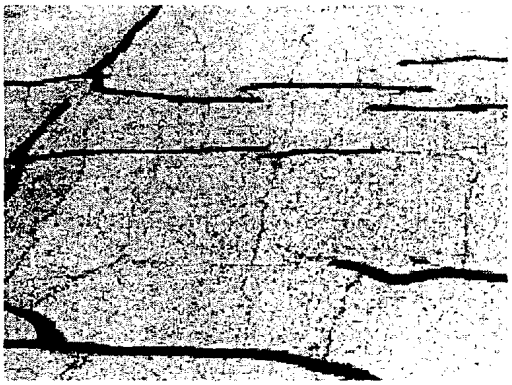
FAIR —
Structural improvement required

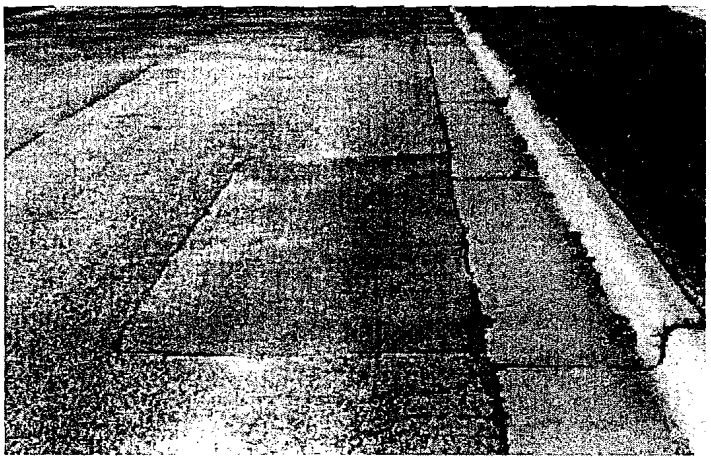
Roads show first signs of needing strengthening by overlay. They have very severe surface raveling which should no longer be sealed. First longitudinal cracking in wheel path. Many transverse cracks and some may be raveling slightly. Over 50% of the surface may have block cracking. Patches are in fair condition. They may have rutting less than ½" deep or slight distortion.

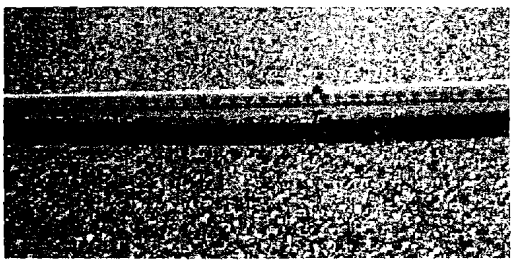


◄ **Longitudinal cracking; early load-related distress in wheel path. Strengthening needed.**

▼ **Slight rutting; patch in good condition.**







▼ Extensive block cracking. Blocks tight and sound.

◄ Slight rutting in wheel path.

RATING 3

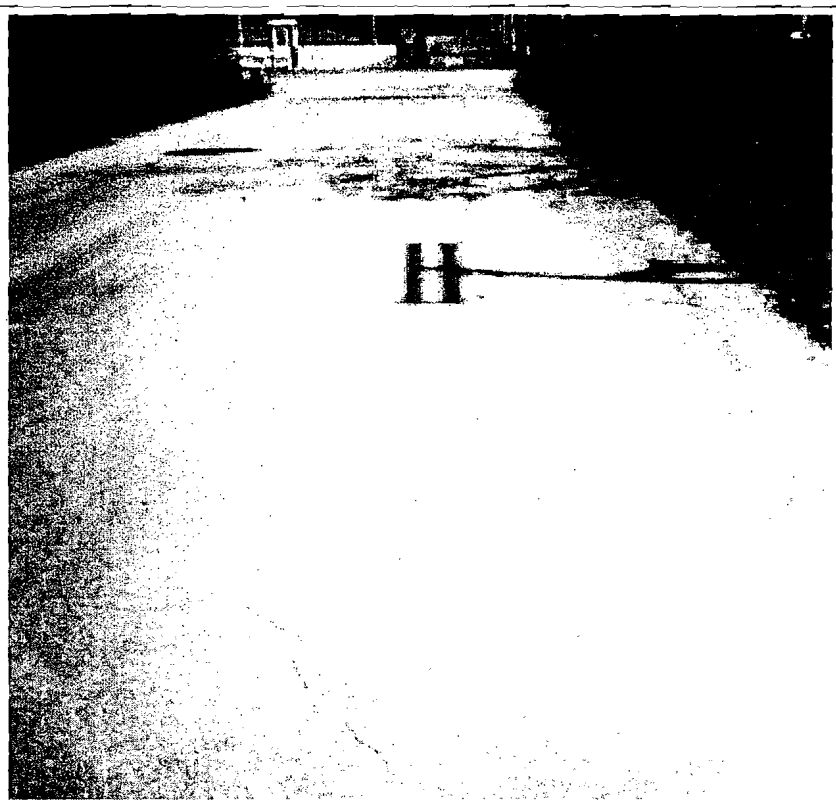
POOR—
Structural improvement required

Roads must be strengthened with a structural overlay (2" or more). Will benefit from milling and very likely will require pavement patching and repair beforehand. Cracking will likely be extensive. Raveling and erosion in cracks may be common. Surface may have severe block cracking and show first signs of alligator cracking. Patches are in fair to poor condition. There is moderate distortion or rutting (1-2") and occasional potholes.

Many wide and raveled cracks indicate need for milling and overlay.

2" ruts need mill and overlay.

Open and raveled block cracks.



RATING 3

POOR — (continued)
Structural improvement required

◄ Alligator cracking. Edge needs repair and drainage needs improvement prior to rehabilitation.

▼ Distortion with patches in poor condition. Repair and overlay.

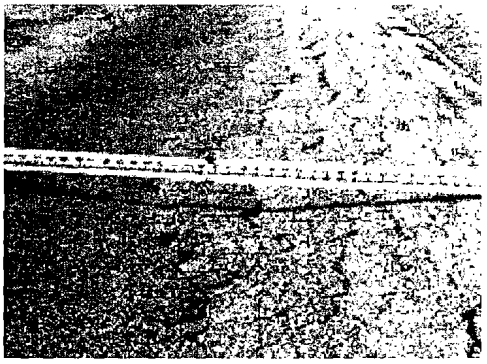
RATING 2

VERY POOR—
Reconstruction required

Roads are severely deteriorated and need reconstruction. Surface pulverization and additional base may be cost-effective. These roads have more than 25% alligator cracking, severe distortion or rutting, as well as potholes or extensive patches in poor condition.

▶ **Extensive alligator cracking. Pulverize and rebuild.**

▲ **Patches in poor condition, wheelpath rutting. Pulverize, strengthen and reconstruct.**



▲ Severe rutting.
Strengthen base and reconstruct.

▶ **Severe frost damage. Reconstruct.**

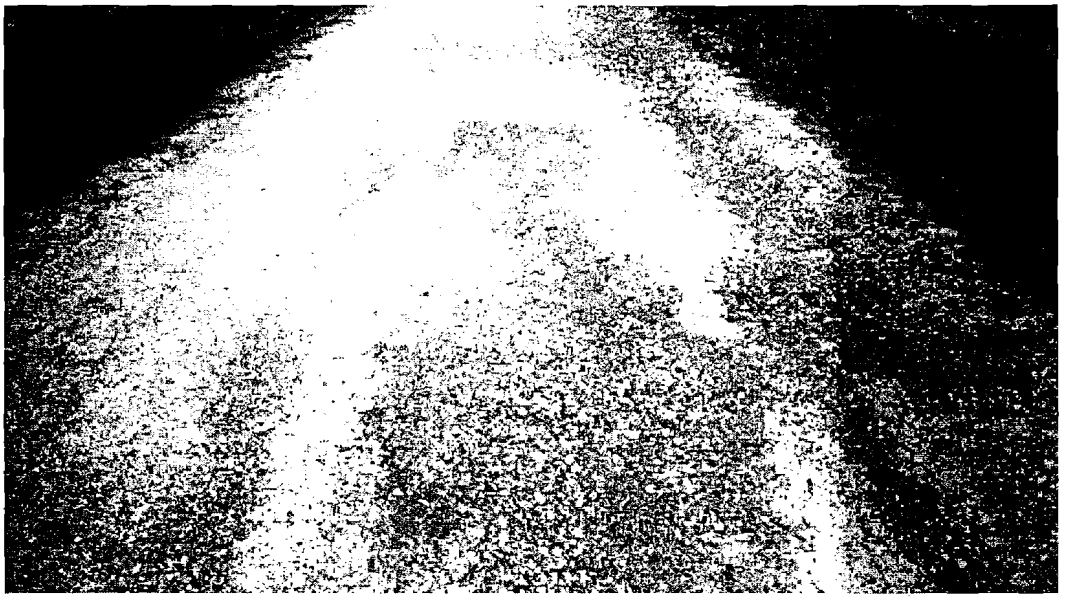
RATING 1

FAILED —
Reconstruction required

Roads have failed, showing severe distress and extensive loss of surface integrity.

◄ **Potholes from frost damage. Reconstruct.**

◄ **Potholes and severe alligator cracking. Failed pavement. Reconstruct.**



◄ **Extensive loss of surface. Rebuild.**

Appendix C. Enhancing Safety on Local Roads

Enhancing safety on roads should be a primary objective for all public officials responsible for the transportation system (Drumm, 2009). Road crashes were responsible for over 41 thousand deaths in 2007, and represent a national public health issue (FHWA, *Road Safety Fact Sheet*). Traffic fatalities are the leading cause of death in the United States for people age 4 through 34. For late teenagers, crashes are not only the leading cause of death, but are also three times greater than the second highest cause.

Not only are crashes a leading cause of death, but they also result in injuries and property damage, incurring a substantial cost to the public, both in terms of pain and suffering from serious injuries (many of which last a lifetime). Additional costs can include lost work time, medical bills, and car repairs or replacement. All of these highlight the critical importance of safety, and why it should be a priority that extends beyond transportation system managers.

Safety should be a multidisciplinary endeavor, which is reflected in the "Four E's of safety," Engineering, Education, Enforcement, and Emergency Response.

- Engineering refers to road design and other elements of the infrastructure that contribute to road safety.
- Education refers to the need to educate drivers regarding safe driving behavior, both when drivers first get their license and later. An example of the on-going need for education is evidenced by the fact that older drivers may be more likely to experience different kinds of crashes than younger drivers.
- Enforcement refers to the need to reinforce safe driving behavior through traffic warnings, tickets and other enforcement activities.
- Emergency response refers to the response time and the ability to get to and from an incident. Faster emergency response may reduce the likelihood of a fatality, or decrease the severity of an injury.

All four of these safety measures, especially Engineering, have well documented countermeasures. One of the best summaries of countermeasures, sorted by crash type, can be found in a series of documents developed by the National Cooperative Highway Research Program (NCHRP), the NCHRP 500 series. Each publication in this series focuses on a particular type of crash and describes appropriate countermeasures. The NCHRP series can be found online: http://safety.transportation.org/guides.aspx (NCHRP, 2004).

Engineering Approaches to Increasing Safety

There are two basic engineering approaches to increasing safety on local roads. The first is based on improvements targeted to high crash locations; the second is based on systematic or programmatic improvements.

High Crash Locations

High Crash Locations (HCL) are also referred to as hot spots, black spots, sites with promise, and many other terms. These locations may either be an intersection or a short segment of road. HCL can be identified by a variety of methods. One method is to examine crash data, either for all crashes, or for targeted crashes, such as all injury and fatality crashes, or serious injury and fatality crashes. Typically, fatality only crashes are not used unless a location has very critical issues and the location has been the site of fatal crashes on a regular basis. Ideally, a critical site would be identified and improved before the fatal crash data indicates a problem. Fatal crashes typically occur too infrequently to use this measure as a sole basis of determining locations that need to be addressed. A combination of fatal and serious injury crashes, fatal and all injury crashes, or all crashes should be used.

There are a number of ways to measure the crash data, including:

- Frequency, or number, of the target crashes,
- Rate of target crashes, per million entering vehicles (MEV) for intersections or per million vehicle miles traveled (MVMT) for segments, or,
- Statistical variation between the expected number of target crashes and the experienced number.

For local agencies, the rate of target crashes works well. Alternately, use of the crash frequency also works well, especially if traffic counts are difficult to obtain.

To identify crash locations, crash data may be accessed from the Automated Reporting Information Exchange System (ARIES) data base, which is the state system that receives, compiles and stores all crashes reported by the police. This crash data can then be plotted on a map of the county, city or town. Crash locations can be identified on a map either electronically, using tools such as Google mapping, or on a paper map.

Access to the ARIES database is provided to local agencies at no cost, and can be obtained for local officials by contacting John Nagle of the Indiana Department of Transportation (INDOT) at 317-232-5464. The ARIES database can be accessed online: http://www.crashreports.in.gov/Public/Home.aspx (ARIES Crash Database, 2009).

There may also be specific reports or publications that identify the HCL within a given agency's jurisdiction. These reports include, but are not limited to, the federally mandated annual five percent report and the annual report by the Indiana Criminal Justice Institute's Traffic Safety Office.

- The annual five percent report identifies the locations currently exhibiting the most severe safety needs. This year, the five percent report includes 254 locations that were screened based on statewide data for state and local roads; 95 of these locations are under state jurisdiction and 159 are under local jurisdiction. The five percent report can be accessed online: http://safety.fhwa.dot.gov/fivepercent/08in.htm (FHWA, 2008).
- The annual report by the Indiana Criminal Justice Institute's Traffic Safety Office identifies intersections only based on frequency of crashes. This report includes sheets for each county and can be accessed online (it is a large file that takes time to load): http://www.in.gov/cji/files/Counties_2008_FINAL.pdf (Indiana Criminal Justice Institute, Traffic Safety Division, 2008)

Once an HCL has been identified, an engineering safety review can be conducted to identify which countermeasures should be implemented. An engineering safety review will identify patterns in the crashes (it may be appropriate to create a crash diagram), based on the data in the ARIES crash reports.

Programmatic Improvements

Programmatic improvements, also referred to as systematic improvements, take a proven countermeasure and apply it to a large number of locations. Such countermeasures typically cost relatively little for each location, but since the countermeasure is implemented at a large number of locations in one program, the cost of a programmatic improvement may be as high as the cost of a single large safety project.

Programmatic improvements may include countermeasures such as new signage or signage upgrades (especially retroreflectivity), guardrail and/or guardrail end treatments, curve treatments, intersection treatments, and a wide variety of other improvements.

If a jurisdiction has a known safety problem, then that may be used to identify the most appropriate programmatic improvement. The ARIES database (discussed previously) may be used to identifying the safety characteristics of a jurisdiction. Table C.1 provides safety characteristics from the eight county sample used in the needs assessment report (this is the same as Table 4.13 in Chapter 4 of the report). The data shown is for all crashes and for all jurisdictions in the county, and includes crashes on state-maintained roads, as well as county, city and town roads.

Table C.1. Crash Data for Eight County Sample								
Crash Characteristic[1]	**Adams**	**Fayette**	**Floyd**	**Fountain**	**Hamilton**	**Lawrence**	**Pike**	**White**
Urban	59.2%	63.8%	73.8%	36.0%	81.5%	50.2%	13.5%	35.3%
Rural	40.1%	36.0%	25.5%	64.0%	18.3%	49.7%	81.6%	64.3%
Driver Age								
16 to 20	20.3%	17.1%	19.2%	21.3%	17.3%	22.2%	24.2%	17.4%
>= 70	8.5%	8.0%	5.6%	5.9%	4.0%	6.7%	4.2%	6.5%
Intersections	30.1%	30.0%	30.5%	19.2%	41.4%	31.7%	18.2%	24.5%
Surface								
Ice, snow or slush	13.4%	9.2%	4.0%	12.8%	7.5%	6.6%	8.9%	12.5%
Wet	14.6%	17.5%	18.8%	13.9%	17.1%	18.7%	14.6%	16.9%
Collision with Object								
Deer	10.8%	11.0%	4.8%	19.9%	3.1%	7.4%	12.3%	19.5%
Tree	2.1%	2.8%	2.4%	5.8%	2.0%	5.9%	6.9%	1.2%
Utility Pole	4.1%	4.1%	2.1%	4.2%	1.6%	3.6%	5.8%	4.0%
Curves	5.8%	9.8%	12.7%	12.9%	8.6%	18.6%	22.5%	9.0%
Overturn/ Rollover	1.2%	1.5%	0.6%	5.0%	0.5%	1.6%	5.2%	3.8%
Pedestrians involved per 100,000 population	13.0	43.5	58.2	17.1	21.9	24.2	7.8	32.5
Bicycles involved per 100,000 population	14.2	18.5	22.6	11.4	11.5	12.5	1.6	7.3

[1] Percent of total, unless otherwise stated for pedestrians and bikes.

Other than distinguishing urban vs. rural crashes, there are twelve different data types that have been pulled from the ARIES database. These are only used as examples; there are many other types of data that could be analyzed. The eight counties shown in Table C.1 vary in population and represent both urban and rural counties. These differences undoubtedly influence the types of crashes observed. For example, Hamilton and Floyd Counties are both suburban counties with most crashes identified as urban; these counties also have a higher percent of crashes at intersections (especially Hamilton). On the other hand, the more rural counties such as Pike, White and Fountain, tend to have more crashes that involve road departures (collisions with trees and utility poles) and collisions with deer.

This example illustrates the type of data that can be used to evaluate potential countermeasures. The countermeasure selected should target the crash characteristics that predominate. Based on

the data in the table above, it may be more appropriate for Hamilton County to target countermeasures that address urban intersections, while it may be appropriate for Pike and Lawrence Counties to target countermeasures that address curves. The ARIES database includes data on pedestrians and bicyclists, as well. Examining the data in the table, Floyd and Fayette Counties may want to focus on crashes involving pedestrians. These are merely examples that illustrate the value of examining crash characteristics within a jurisdiction to identify trends regarding crash types. Identifying crash trends may allow countermeasures to be targeted to address the prevalent crash type.

The key principle is to allow the data to guide decisions regarding potential countermeasures. To further illustrate the concept, the following comments are provided to address the different types of crashes and countermeasures that may be considered. These topics correspond to the rows in the table above. These are only examples, and other concepts may be appropriate.

- Driver Age 16-20. For counties with elevated crashes in this category, countermeasures typically include education and enforcement activities. Teaching teens the rules of the road and the reason for and effectiveness of safety features may help. A partnership with local schools may be appropriate.

- Driver Age >= 70. If the percent of older driver crashes is relatively high, it may be appropriate to replace signs, particularly street signs, with larger, brighter lettering. This will aid all drivers, especially older drivers. These improvements may be focused near retirement villages as warranted by crash data. Targeted education might also be in order.

- Intersections. Engineering countermeasures are numerous and include, but are not limited to: backing plates on signals for enhanced visibility of the lights, advanced warning signs, LED signals (if not present), additional/supplementary signs such as Stop Ahead signs, clearing brush in quadrants to open up sight distance, improved pavement markings to help guide drivers into and through intersection. An analysis of intersection crash data may help identify trends and the most appropriate countermeasures. As noted previously, a systematic approach will identify one or two countermeasures and apply these countermeasures to a large number of locations.

- Surface, Ice or Snow/Slush. As expected, counties toward the north typically have more of an issue with crashes related to this condition. Concentration on a strong program for snow removal, surface treatments and pre-treatments, weather prediction, and surface sensing may be helpful.

- Surface, Wet. Prevalence of this type of crash may be due to more rain overall or to poor drainage. It may also result if the pavement surfaces at intersections or curves have lower friction numbers. A more detailed analysis of the wet-weather crashes will help identify the most effective programmatic countermeasures to reduce this type of crash.

- Collision with Deer. More typical in rural counties, deer crashes have been increasing in recent years and are receiving a greater focus on a national level. Many experimental features have been tried with a few showing minimal success. Education of the public, particularly during high deer-movement months, clearing back brush from roadsides, and mowing the roadsides may help.

- Collision with Tree. The best treatment is removal of trees near the road. Alternately, adding rumble strips or stripes may be helpful. As a final resort, delineating the trees with retroreflective material may be appropriate.

- Collision with Utility Pole. Removing or relocating the poles farther from the road is the best course of action, however, a very expensive one that requires a lot of coordination with the utility companies. Similar to tree crash countermeasures, rumble strips and stripes to keep drivers on the road, and retroreflective material to highlight pole locations may reduce crashes.

- Curves. For this type of crash, a curve countermeasure program would typically include adding advance warning signs, chevrons and pavement markings to a large number of curves in the jurisdiction. Shoulder treatments (paving wider), installing rumble strips, and tree removal on the outside of curves may also be appropriate. Changing the geometry of the road would increase safety, although it may be cost prohibitive.

- Overturn/Rollover. Widening or stabilizing shoulders may reduce crashes in corridors that have a high incidence of rollover crashes. Installing a Safety Edge, a 45-degree wedge on the side of roads when they are being repaved, would provide significant long-term benefits by reducing rollover crashes. Improved edgeline pavement markings or rumble strips/stripes will also help reduce rollover crashes.

- Pedestrians and Bicycles Crashes. Motorized crashes with pedestrians and bicycles should be analyzed in greater detail, including the locations and causes, to develop a program of safety improvements that will make roads safer for non-motorized users.

Conclusion

There are a number of ways to improve safety on local roads. Improvements should be made based on data, such as the identification and improvement of HCL and the identification and implementation of appropriate programmatic improvements.

Although road crashes claim thousands of lives each year, investments in safety have made great strides in improving traffic safety. In fact, recent data indicate fewer fatalities in 2008 than in 2007. Not only did the number of deaths decrease, but the traffic fatality rate per 100 million VMT decreased (National Highway and Transportation Safety Administration, 2008). This further substantiates the benefits of investing in transportation infrastructure safety improvements.

Appendix D. Glossary of Terms and Acronyms

Bridge Definitions

Structurally Deficient (SD): This classification is given to a bridge that is restricted to light vehicles only, is closed, or requires immediate rehabilitation to remain open due to deterioration of structural components. According to the FHWA, a restricted-use, structurally deficient bridge is not necessarily unsafe, and strict observance of the posted allowable traffic load and vehicle speed will generally provide adequate safeguards for those using the bridge.

Functionally Obsolete (FO): This classification is given to a bridge on which the deck geometry, load carrying capacity (comparison of the original design load to the current state legal load), clearance, or approach road alignment no longer meet criteria for the system of which it is an integral part. According to the FHWA, a bridge designated FO is not unsafe for all vehicles; however, it has older design features which prevents it from accommodating current traffic volumes and modern vehicle sizes and weights.

Any bridge classified as SD is excluded from the FO category. Accordingly, a bridge is first checked for SD designation, and if it is not SD, it is assessed to see if it is FO.

The above bridge definitions are defined in the *Recording and Coding Guide for the Strucutre Inventory and Appraisal of the Nation's Bridges* (FHWA Office of Highway Policy Information, 1988). Additional resources that provide more detailed information on bridge conditions are also available (FHWA Office of Engineering, Bridge Division,1995; FHWA, 1997; Dunker and Rabbat, 1995).

Glossary of Acronyms

Table D.1 provides a listing of acronyms used in this report.

D.1. List of Acronyms

Acronym	Explanation
AASHTO	American Association of State Highway and Transportation Officials
ARIES	Automated Reporting Information Exchange System
ADT	Average daily traffic
AVMT	Annual vehicle miles traveled
B	Billion
CAGIT	County Adjusted Gross Income Tax
CEDIT	County Economic Development Income Tax
COIT	County Option Income Tax
CPI	Consumer price index

Table D.1. List of Acronyms (Continued)	
Acronym	**Explanation**
CVET	Commercial vehicle excise tax
CY	Calendar year
FHWA	Federal Highway Administration
FO	Functionally obsolete (designation for bridges)
FY	Fiscal year
HERPICC	Highway Extension and Research Project for Indiana Counties and Cities (predecessor of LTAP)
HCL	High crash location
HMA	Hot-mix asphalt
IC	Indiana Code
IDOR	Indiana Department of Revenue
INDOT	Indiana Department of Transportation
JTRP	Joint Transportation Research Program
IRI	International roughness index
LED	Light-emitting diode
LTAP	Local Technical Assistance Program
LPA	Local public agency
LOHUT	Local option highway user tax (wheel tax & excise surtax)
LRS	Local road and street (funding source)
M	Million
MEV	Million entering vehicles
MPI	Municipal price index
MVH	Motor vehicle highway (funding source)
MVMT	Million vehicle miles of travel
MUTCD	Manual on Uniform Traffic Control Devices
NBIS	National Bridge Inspection Standard
NCHRP	National Cooperative Highway Research Program
NHS	National Highway System
PASER	Pavement Surface Evaluation and Rating
PCC	Portland cement concrete
PCR	Pavement condition rating
PPI	Producer price index
SD	Structurally deficient (designation for bridges)
TIF	Tax increment financing
VMT	Vehicle miles of travel
VOC	Vehicle operating cost

Appendix E. Case Studies

The following case studies illustrate some of the challenges faced by local agencies that must provide an adequate transportation system given increasing expenses and revenues that have not kept pace with inflation. A list of the case studies is shown in Table E.1.

Table E.1. Indiana Case Studies

Case Study	Location	Title
1	Westfield	Transportation Funding Constraints Do Not Allow System Expansion
2	Hendricks County et al	Delayed Transportation Projects Compromise Economic Development Opportunities
3	Monroe County	Transportation Expenses Have Risen Significantly
4	Madison County	Employee Reductions to Provide Maximum Funds to Roads
5	Carroll County	Funding Constraints Result in Conversion of Paved Roads to Stone
6	Boone County	Inadequate Funding for Pavement Management

CASE STUDY 1: Transportation Funding Constraints Do Not Allow System Expansion

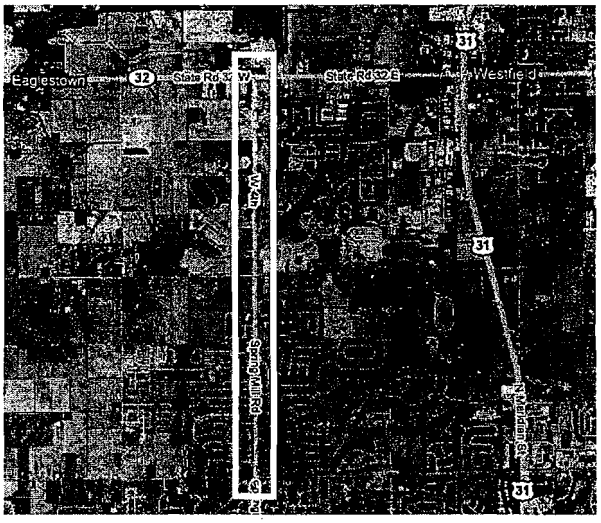
Agency: City of Westfield

Project: Improvements to Spring Mill Road

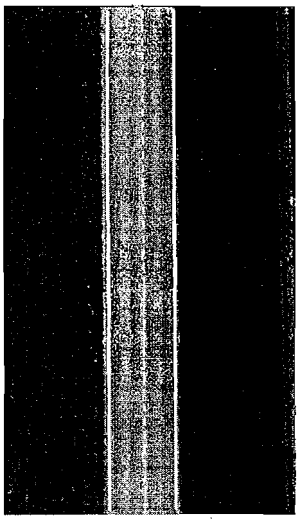
Situation: Limited transportation funds do not allow system expansion. Westfield identified a proposed improvement to Spring Mill Road but has not implemented the project due to funding limitations.

The proposed project would improve Spring Mill Road between 146th St and State Road 32. These improvements would increase capacity, reduce motorist delay and provide an alternative route to US 31. The estimated cost of these improvements is more than $16 million.

The lack of improvements to Spring Mill Road has impacted development in the area. For example, development in some locations along corridor (e.g., land at 161st and Spring Mill Road) has been restricted because "the road infrastructure is currently inadequate to serve the existing study area (Westfield Community Development, 2008)."



Transportation Improvement: Reconstruction of Spring Mill Road between 146th Street and State Route 32 (176th St)



Current Cross Section, 2 Lane Road with Turn Bays

Figure E.1.1. Proposed Transportation Improvement Cannot be Implemented with Current Transportation Funding in Westfield, Indiana

(Google Maps, 2008)

CASE STUDY 2: Delayed Transportation Projects Compromise Economic Development Opportunities

Agencies: Hendricks County, Boone County, Plainfield, Avon and Brownsburg

Facility: Ronald Reagan Parkway

Situation: A lack of funding has delayed completion of the Ronald Reagan Parkway, resulting in lost opportunities for economic development.

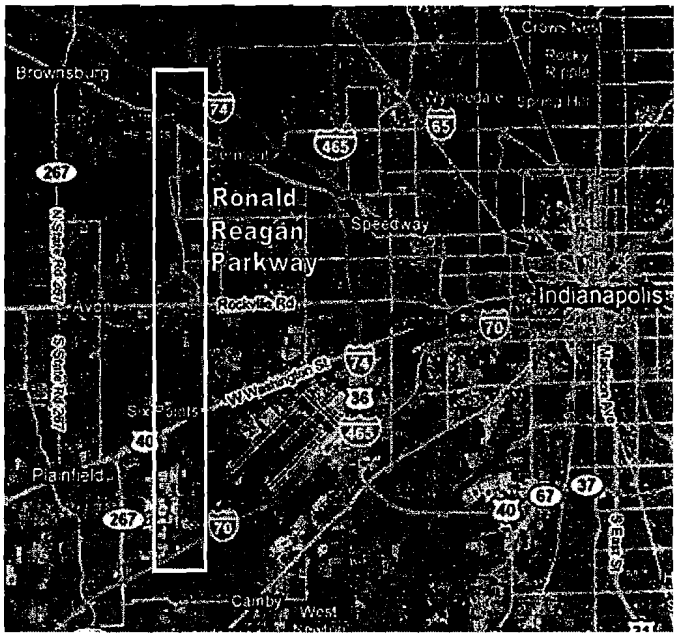


Figure E.2.1. Proposed Ronald Reagan Parkway
(Google Maps, 2008)

Background
Plans for what is now called the Ronald Reagan Parkway project were initiated approximately 20 years ago. When completed, the 12-mile parkway will link Plainfield and Avon with I-70 at the southern end to I-74 at the northern end, as shown in Figure E.2.1. The corridor is located just west of the Indianapolis International Airport, and includes rail-accessible land located adjacent to the CSX railroad near Avon. This site is one of the few sites in the Indianapolis area that is available for development and is accessible to an existing rail line. Long-term, the corridor may be extended approximately 5.5 miles from I-74 north to I-65 in Boone County, further enhancing the transportation network in the region.

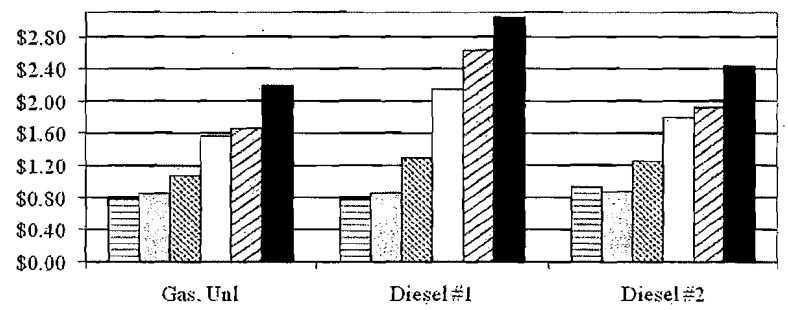
Regional Goal
The proposed Ronald Reagan Parkway is an important transportation link that would benefit the entire region. The potential economic development potential is very strong. For example, the Town of Plainfield estimated the cumulative increase in assessed value for the Six Points Economic Development near the Ronald Reagan Parkway at $25.96 million for 2008.

Cost
The estimated cost to complete the parkway is $120 million. This cost increases approximately $6 million every year the project is delayed (Becker, 2008). A variety of funding sources have been used for this project, including local funding sources such as tax increment financing district funding and wheel tax funding.

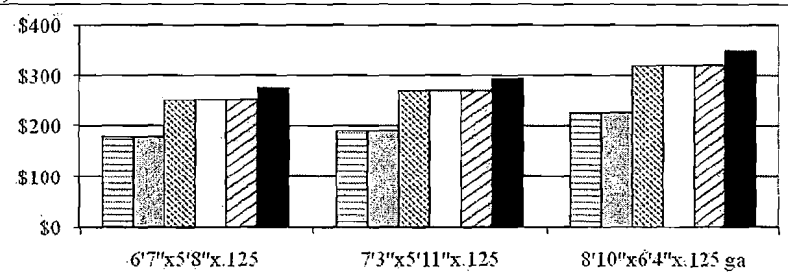
CASE STUDY 3: Transportation Expenses Have Risen Significantly

Agency: Monroe County

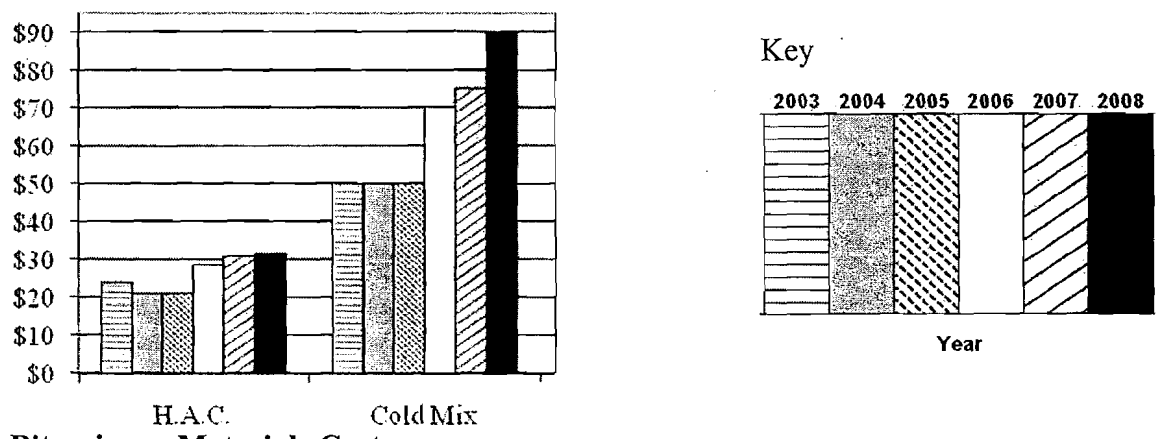
Situation: Transportation expenses have risen significantly for cities and counties throughout the state. The increase in expenses has been documented by the Monroe County Highway Department material bids, which have been tabulated every year for a wide variety of items including gasoline, guardrail, aggregate, pavement markings, corrugated metal pipe, aluminum structural plate, bituminous material, and bridge crew wages. The increase in costs is illustrated by the sample data provided in Figure E.3.1, which documents cost increases for fuel, aluminum structural plate and bituminous materials.



a) Fuel Costs



b) Aluminum Structural Plate Costs



c) Bituminous Materials Costs

Figure E.3.1. Costs for Maintaining Infrastructure Have Increased

CASE STUDY 4: Employee Reductions to Provide Maximum Funds to Roads

Agency: Madison County

Situation: Madison County has made personnel cuts to maximize the funds available to maintain the 917 miles of road for which they are responsible. Since 1995, Madison has eliminated 19 positions to reduce costs, as shown in Figure E.4.1. Forty-four full time employees remained in 2008, approximately half of these employees are used to complete annual chip seal work. Since so many employees are needed for chip seal work, there are not enough people to perform other important tasks. Important tasks such as brush control, drainage maintenance, sign maintenance, mowing, berm and stone shoulder maintenance are all compromised.

Aging Equipment
Another result of reduced revenue is that aging equipment has not been replaced. For example, sixteen tandems were purchased in 1997, and although the average mileage per truck is 120,000 miles, they remain in service. The current replacement cost for these trucks is $2.2 million ($280,000 per year for a 10 year loan), funding which is not available. Similarly, a rubber tire excavator was purchased in 1991 for $122,700. The replacement cost for this equipment is $250,000.

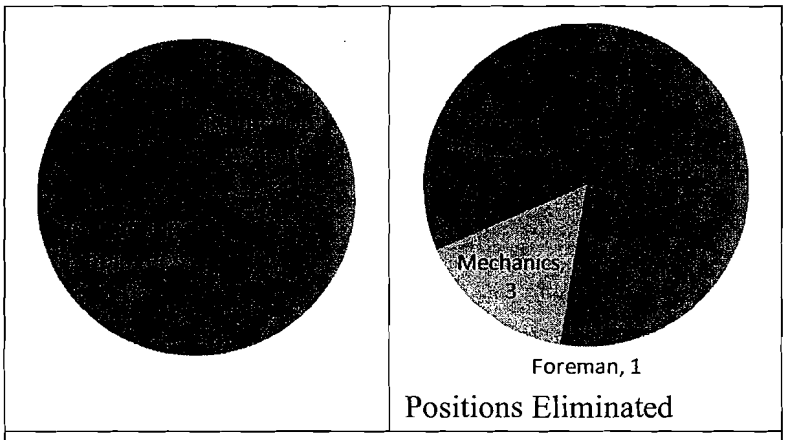


Figure E.4.1. Employee Reductions Help Reduce Costs (19 Employees since 1995)

Increasing Costs and Static State Revenues
Costs have increased significantly and transportation funding has remained relatively constant. Income from MVH and LRS has increased 0.5% each year for the past 10 years; this increase does not cover increases in expenses. Increased expenses for Madison County include (from 2005 to 2008): concrete paving costs increased 67 percent, chip seal material costs increased 60 percent, asphalt costs such as strip patch increased 50 percent, cold mix asphalt increased 40 percent, gasoline increased 60 percent; diesel increased 70 percent, winter salt and sand costs increased 25 percent, and patching costs doubled. The increasing costs and static revenues have made maintenance of roads difficult. In fact, Major Moves funding was the only thing that kept the road program viable in recent years, and this funding source is no longer available. In response to the state road funding shortfall, Madison County passed a wheel tax in 2008.

CASE STUDY 5: Funding Constraints Result in Conversion of Paved Roads to Stone

Agency: Carroll County

Project: Paved roads revert to stone due to funding constraints

Situation: In the late 1990s, the engineer and supervisors in Carroll County were able to upgrade over 300 miles of county road from unpaved to chip seal pavement. However, as the county highway department funding decreased relative to the cost of maintaining roads, the highway department no longer had the resources to maintain the network of paved roads. In 2005, the Carroll County Highway Supervisor evaluated several options to alleviate the problems caused by a decrease in available funds, in terms of inflation adjusted dollars. As a result of the funding limitations, many chip seal roads were in a state of disrepair. The county had to make a difficult decision to either expend scarce funds for maintenance and seal roads in poor condition, or convert the roads back to their original aggregate surface state.

Assessment indicated that 24 miles of chip seal roads on the county road system needed to be converted back to unpaved roads. Although less expensive for the highway department, unpaved roads are less desirable to county residents, and also result in higher user costs, as compared to paved roads. Drivers incur lower fuel efficiency and greater vehicle wear and tear when driving on unpaved roads.

In 2005, five miles of the county road network were converted to stone. In 2007, 19 additional miles were converted to stone. Although not a popular decision, the conversion to unpaved roads reflects the fact that current funding levels do not allow all county roads to be maintained properly.

Figure E.5.1. Paved Roads Are Converted to Stone Due to Limited Funding

CASE STUDY 6: Inadequate Funding for Pavement Management

Agency: Boone County

Facility: Boone County Road Network

Situation: Pavement management practices preserve the road and extend its life. The current funding level does not allow counties to implement good pavement management practices for the entire network with standard maintenance intervals.

Pavement management combines the application of engineering practices and fiscal management into recommendations for cost-effective treatments at specified intervals. The benefit of a pavement management system is an improved and stable road condition level at a lower unit cost per lane mile (*National Center for Pavement Preservation*).

Boone County has identified a pavement management system to provide optimal use of resources and to assure that the transportation infrastructure is wisely maintained. The details of Boone County's pavement management program are shown in Figure E.6.1. This management program outlines intervals of five years for seal coat and 20 years for resurfacing activities. Unfortunately, based on the current funding level, this pavement management program could be applied to only 33 of the 474 miles in Boone County, which is less than 7 percent of the road network.

Input Values		
Total County Road Mileage	800	miles
Total Paved Mileage (59 percent of all county roads)	474	miles
Seal Coat Interval	5	years
Seal Coat Cost	19,794	$/mile
Resurfacing Interval	20	years
Resurfacing Cost	73,820	$/mile
Current Available Funding	30,000	$
Funding Required for Minor Maintenance	50,000	$
Costs and Production Required to Maintain Desired Program		
Annual Cost	5,670	$/mile/year
Annual Sealing Program	71	miles/year
Annual Resurfacing Program	24	miles/year
System Cost – Paving and Sealing	3,156,887	$/year
Total Pavement Maintenance Cost	3,206,887	$/year
Annual Shortfall	2,906,887	$/year
Program Possible with given Mileage, Budget and Costs		
Sealing Interval	72	years
Resurfacing Interval	216	years
Mileage Possible with Existing Budget and Desired Program		
Mileage	33	miles

Figure E.6.1. Boone County's Pavement Management Program for Bituminous Roads

Alternatively, to provide maintenance on the entire network of paved roads in Boone County, the sealing interval would need to be extended to 7 years and the resurfacing interval would need to be extended to 216 years, which is obviously significantly longer than the life a pavement.

LTAP is an established nationwide system of technology transfer (T2) centers. Funding for the centers comes from federal LTAP funds, state departments of transportation, universities, local agencies, and finances designated by State legislation.

Indiana LTAP provides technical assistance and training to the highway, road and street departments of all counties, cities and towns in Indiana that are responsible for over 80,000 miles of roads and over 12,000 bridges.

Indiana LTAP works hard to serve city and town street departments, county highway departments, city and county engineering departments, city mayors and town managers, county commissioners, county surveyors, MPOs and RPOs, police departments, consultants, and contractors.

LTAP
LOCAL TECHNICAL ASSISTANCE PROGRAM

PURDUE
UNIVERSITY
SCHOOL OF CIVIL ENGINEERING

Dear Local Community Colleagues:

LTAP has been invited to speak in front of the *Indiana Joint Study Committee on Transportation and Infrastructure Assessment and Solutions* chaired by Representative Ed Soliday. As I understand it, the committee would like to spend its first year collecting assessment information. They would like to know what the challenges are for local agencies that build and maintain our highways, bridges, roads, streets, and drainage here in Indiana. In helping us prepare for this presentation, I would like to pose to you the following question:

"Outside of funding, what are the **three major challenges** you encounter on a routine basis in your position as you work to maintain the roads, bridges, and drainage in your jurisdiction?"

You may simply "Reply" to this email or email your response to the below email.

Thank you for your assistance with this important issue,

John Habermann, P.E.
jhaber@purdue.edu
Program Manager
Indiana LTAP
Purdue Civil Engineering

1. Historic bridge preservation, drainage ditch easements/right-of-way, time lag on federal-aid projects

2. In our county the main obstacle, other than funding, is weather. Next would be labor and equipment, which could be tied to funding.

3. Problems with right-of-way, utility relocation, permits

4. Primary non-funding issue for us is that the public simply does not comprehend the amount of increased maintenance that we incur due to the transformation to "Big Ag". Routinely we have semi trailers loaded in excess of 50T on all manners of our county roads. The public has a difficult time understanding how the traditional roadway base was established, in some cases over a hundred years ago, and this base is sub-par for current loading.

   We have good public awareness in that we are transforming from pit-run gravel to limestone on our roads. In similar fashion, the public understands that there is no funding available for new blacktops.

   We have accomplished a level of understanding with our elected officials, the need for systematic planning for chip and seal and bridge and small structure rehab and replacement.

5. 1. Having an adequately, well-trained workforce. That takes funding.
   2. Having good, up-to-date equipment in order to maintain our roads and bridges. That takes funding.
   3. Keeping the public informed and apprised of what it takes to keep our roads and bridges well maintained without proper funding.

6. Funding is the main problem, but sometimes the time it takes to get things approved through the state is a big problem. Getting IDEM and DNR to act on some projects puts the county leaders at odds with the public. Everyone wants it completed "NOW". As a commissioner, I understand projects approval takes time, but the public doesn't understand.

7. Our biggest problem is funding, funding and funding. I don't see it getting any better for some time. On a local level, we have no right of way. We only go from edge of road to edge of road. Therefore, there are folks who won't let us ditch, mow, or anything. As far as bridges go, we don't take any federal funds to do bridges. We do our own with our bridge crew. We fund it with cum bridge funds and it works out well for us. Many counties that rely on federal funding are really going to be in a bind in the very near future. We must rely less and less on the government to bail us out.

   I am a great fan of steel grated bridges for 15', 20' 30' 50' length crossings. Engineering firms pretty much discourage them because there is no money in it for them. That being said, a lot of folks in positions similar to mine err on the side of consultants. My point is, if you ever want to bring highway folks down here to actually see what we do, we would be happy to show them. I feel very strongly on how we "think outside of the box" and accomplish what we do here. We have replaced/repaired approximately 30 bridge structures since I came here. If we had used federal highway funding it would have been in the MILLIONS! We fund all of our work utilizing cum bridge funds. These structures are "worker friendly" and I'm sure there are a lot of guys in other counties who could do this type of work. With funding the way it is and will be, commissioners and highway folks had better get creative!!

8. I think funding is the biggest issue. Right-of-way issues are real, but are probably about the same for all of us. I think right-of-way is an issue best dealt with locally. We occasionally run into a land owner that is inflexible, but more often than not, if we take the time to approach people, they work with us so that we can do what we need to do. If it is serious, then we have the tools to force the issue if necessary.

   Costs associated with maintenance and construction continue to increase while revenue either flat lines or declines. Health insurance, fuel, and equipment repairs continue to eat up our budget. We would barely be able to keep the doors open if we weren't fortunate enough to have some riverboat revenue. I know a lot of counties have either laid workers off or leave vacant positions unfilled to try and scrape by.

   I think the legislation that increased the amount of work that can be done "in-house" last session was a good idea. I would love to see the legislature look at a federal funds trade for LPA's with INDOT. I think that could provide some help.

   At some point, however, our lawmakers (and I think this is true on the state and federal level) have to acknowledge the issues and actually come up with some solutions. You can provide a certain amount of service for a certain cost. If you continue to reduce the available funding, then the level of service that can be provided will also have to decline. I would like cheaper gas and lower income and property taxes just as much as the next guy, but there needs to be an honest debate about what level of service can be provided at the current funding levels. If, as a state, we refuse to fund our local highway departments sufficiently, then it should be understood that we may be holding onto some money with one hand, but we're going to be giving up some services from the other. Everyone wants better infrastructure, but no one wants to pay for it!

I often see a huge disconnect between the public's perception of how government works and how it actually functions. I don't know if an effort to educate the public would pay any dividends or not, but it might be worth trying. I hear from constituents all the time that they pay property taxes and they want their road paved....even though there's not a penny of property tax that is used to pave roads in my county.

Aside from finding additional funding, I think there are very limited options available that could provide real help....it almost always boils down to "how do we pay for it?"

9. Our money problems are the result of a lack of understanding by the general public of what we do, why it's important, and what it costs. I can understand the public's lack of knowledge, based on my own experience. I was completely unknowledgeable about government operations prior to being hired a few years ago. Getting knowledge out to the public will help our cause tremendously.

10. The challenge we have on bridges is there age and the deterioration of them , thus posing a problem for students riding on busses. On roads, due to the high cost of liquid asphalt we have had to reduce sealing

    From 50 miles a year to less than 10 miles a year. This is the third year of reduction and our roads are failing. Costs have gone from $3,000.00 a mile to $10,000.00 a mile for sealing and chipping.

    Due to the economy we have had to lay off workers thus adding to unemployment.

11. 1. Objective assessment and prioritization of issues needing attention (this issue is somewhat related to funding).
    a. Having trained and qualified personnel to make assessments and the documentation skills necessary to justify expenditures.
    b. Allocating the time necessary for personnel to do the assessments and documentation needed.
    c. Keeping political agendas and influences separated from an objective project prioritization and fund allocation process.

    2. Allocation of personnel to do the actual work (this item is directly related to funding issues).
    d. It is difficult to assign personnel to projects when the "day to day" operational issues take much of their time.
    e. Budget cuts have reduced staffing levels.
    f. Budget cuts have made it difficult to keep quality personnel on staff.

    3. Interaction with State & Federal Agencies that oversee and/or influence projects can be very challenging.
    g. IDEM-EPA – on storm water quality and MS4 issues
    h. INDOT-FHWA – multiple regulations on funding assisted projects
    i. DNR-Army Corp of Engineers-IDEM – on wetland issues

12. Bus routes, lack of proper equipment, lack of knowledge on infrastructure and how best to lay roads so that they last longer

13. The issue of money is certainly the single largest issue that we face in maintaining and reconstructing drains throughout the county. However, there exist issues and project delays

caused by state and federal environmental regulations. Certainly some environmental regulations are needed. What we seem to be seeing is bureaucrats interpreting the regulations to fit their own agenda and thereby causing delays and increased project costs.

14. Our officials involved with transportation infrastructure have discussed your questions regarding what factors other than inadequate funding are impacting our ability to maintain roads.

    We have come to the conclusion that **funding is the major reason** - which is no surprise to anyone.

    First of all, we believe that the quality of a community's roadways is something potential investors in a county consider when looking to locate there. You are well aware that transportation infrastructure is key to economic development. Poor roads reflect poorly on the community. In the current economic climate - with unemployment levels as they are - we certainly need to present a positive, progressive impression all across the state - something that is difficult to achieve when funding for road maintenance is inadequate.

    As you are well aware, rural roads were initially constructed for lower volumes and lighter loads, therefore when the transition from gravel to chip and seal began, those roads were certainly a great improvement. However, with today's traffic volumes and load weight, roads take much more abuse. We are blessed with a wide variety of soil types which provide challenges when it comes to road construction and maintenance — and increases costs.

    Here is the scenario. We have approximately 820 miles of roadways. Of that total approximately 720 are hard-surfaced, with the remaining 100 miles gravel. In prior years, it was not unusual to resurface 100 miles or roadway annually. We were also attempting to upgrade from gravel to chip and seal when funds were available. In 2011, we were only able to afford to resurface 25 miles. At that rate, it will take more than 28 for us to be able to afford to resurface all of our hard-surfaced roads. Forget about upgrading from gravel to hard surface. The roads in our unincorporated towns and around lakes are deplorable. **This is unacceptable.**

    It is unreasonable to expect local governmental units of government to adequately maintain their transportation system with the same amount of money they had available 10 years ago when the cost of materials has increased dramatically.

    We have not purchased any new equipment for several years. Our employees have not received a raise in two years. Our highway buildings are not being adequately maintained.

    We also believe it is long past time for the State of Indiana to add pick-up trucks to the formula for local transportation funding. Why they were exempt initially remains a puzzle.

    We also believe that state and federal regulations have impacted road funding.

15. Political. This is really tied to funding in many ways, but projects often become political hot-potatoes to be tossed about because a politician or advocates who are politically active have low opinions about a project. The time and effort required to overcome the personal biases and unfounded opinions costs a lot of tax payer dollars in terms of resources spent, additional billable hours which translate to cost overruns, and ultimately increased construction costs from the delays. Another component of the political category is the federal-aid process. It's far too

cumbersome to be worthwhile. I know this might seem like more of a funding issue, but can anything be done to change the process to give LPAs autonomy in the project they implement? There is no trust, only more oversight. Finally, I would call fundraising a third component. Some consultants participate in this process and it drives up the cost of doing business because they get their money back when they get work (and they do) and start billing. It's a nasty business which just isn't discussed.

Educational. Most people, politicians and otherwise, don't understand what engineers do, much less how a project develops, its rationale, how it's designed, how it's funded, etc. Access to accurate information is vital, but also difficult to find for non-technical people. And it's even more difficult for a non-technical person to discern good information from skewed, old, biased, or just plain bad information. I even have advocates here who take good information, like the LTAP needs assessment, and misrepresent it for their own ends. It takes a lot of work to overcome misused information.

Apathetical. The average person thinks that the government ultimately will do the right thing. This results in people not actively supporting a project. This passivity is countered with folks who actively oppose projects, usually the same small interest groups. In a public setting, it's difficult for politicians to consider sides of an argument which are not represented in public meetings, the public input process, etc. I don't believe that the majority of people are served in this scenario, although I'm not sure how to give people incentives to participate.

16. Politics. Infrastructure condition is frequently overlooked and is often low on the list of political priorities. If infrastructure does happen to be involved in political discussions, projects that have political priority often get support over projects with the greatest need or benefit. Additionally, when more than one jurisdiction or agency is involved, turf wars often inhibit maintaining and upgrading infrastructure in boundary areas. Priorities are usually misplaced.

    Inefficiency in the entities involved. More often than not, lack of communication is the one factor that hinders the progress of projects. Whether it's government departments either not communicating with each other, or the design consultant that is habitually slow to return phone calls and emails, or the red tape to cut through at state and federal levels to coordinate or obtain permits, getting projects moving and keeping them moving requires more time, effort, and frustration than anything else I can think of. Sometimes there are turf wars between departments within the same government agency that obstruct progress.

    Public perception and support. This is also linked to politics. I've found that the majority of opposition to a project usually comes from people being misinformed or uninformed. Often one or two irate citizens will stir up a large number of people in their local area to oppose a project based on misinformation, misplaced perception, misdirected anger, or fear. We often approach elected officials, the public, or perhaps another agency under the assumption that we're dealing with rational people who will listen to reason and logic. The opposite is most often true.

17. Rumor/Misinformation
    We have difficulty conveying the advantages of a project to the public. Between the rumors that fly and actual lies spread by opponents to projects, we have an uphill battle to inform the public and build support for projects despite using public involvement processes in project development.

Time
Inventory of road and sidewalk conditions to provide data for intelligent decisions is a major challenge to collect and verify.

Records
Property records are a mess. I've hired surveyors and title companies to investigate deeds, trying to find out if alleys were vacated, who owns the right-of-way, and where the property lines are. Particularly in the older parts of town, the county records are not always reliable.

18. Our only major problem is funding. I can't think of 3 major problems besides funding. Everything else is minor and is probably somehow linked to funding anyway.

19. The top 3 items would be:

    1. Limited road right-of-way. This is a problem with providing drainage for roadways. This does not allow utilities much room to occupy the right-of-way and keep out of the way for maintenance. Another problem is sight distance when farmers' corn crop gets tall. It also is a problem for minor improvements, such as intersections with right and left turn lanes and adding small shoulders.
    2. Adequate preventive maintenance is a problem. If we could provide more seal coats and overlays, our roadways would be much easier to maintain. It seems that our costs for patch mix is increasing year after year because of lack of adequate maintenance. Also, this lack of maintenance will undoubtedly result in higher repair costs in the future, which will put us even farther behind.
    3. The ability to do large projects with our own forces. By law, we are limited to the amount of money we can spend on a local project using our own forces. We can do a lot more with our forces and save more money. If we were to get a large influx of money, we would be limited to the size of projects we can accomplish.

20. Well, funding of course, but outside of that, one of our big problems is our narrow right-of-ways. Farm machinery has continued to increase in size and most farmers these days have 2 or more semis. Our intersections were never designed for today's needs. Beside visibility issues we keep losing signage due to insufficient turning radius. We just received notice of a law suit in which we are named because our "County Road" was narrow and not posted as such and a car hit a farm tractor. A ridiculous law suit but you have to fight it just the same. Our wheel tax does not allow us to address the very large farm wagons being used to haul grain to market. 600 bushels at 60 pounds per bushel on 4 tires, probably does more damage than a semi and they are not taxed. We need a provision to tax grain wagons over, say 300 bushels. I took a look at our review vs. cost and over the past 10 years review is up 1% while fuel and asphalt are up 300%. We are just getting further and further behind each year with no solution in site.

21. Cattle panels upstream and downstream of our bridges catching debris are a challenge keeping cleared. Semis turning corners short is a major challenge. Farmers not maintaining their waterways causing mud from fields filling our side ditches in.

22. On Dec. 12, 1958, an easement for 25' from the centerline of the road was recorded after my Dad had signed it in return for a promise of a commissioner for a "blacktop" road. Granted, the blacktop in reality was a chip seal surface but my family was tickled to death. It surely did beat the gravel. This policy initiated by the commissioners continued into the late 1970's when the blizzard destroyed 87 miles of those thin chip seal roads. When I started in 1985, I asked the

commissioners to reinstate the policy that states we will not improve any road without the landowner signing a perpetual easement for right-of-way. Our county attorney approved the form and since then we have been able to build 106.66 miles of new hard surfaced roads. We have recorded over 600 easements along the way. It takes time to get the deed references and to prepare the form, but it is well worth the trouble. Have people balked along the way? A few, but if you are willing to work with people, they will usually see your side. If they refuse to sign, we have a very effective tool. We will improve another collector route with people who will sign. With only 299 miles of hard surface roads out of a total of almost 800 miles, we have a long way to go.

23. Right-of-Way is the largest obstacle we have. In addition to the farm equipment mentioned, we can't correct certain roadside safety items, drop-offs, embankments, drainage and the list goes on without reasonable width of ROW. Under consideration is a revised ordinance that will help with future development but the existing county highway system has been in place for quite a while. Other than requesting right of entry and indemnification we simply don't have adequate space to correct early to late 1800's right of way's using current standards.

    One simple example regarding embankments is we have certain roads with adjoining embankments that stretch several thousand feet and the snow plows simply don't have any space for snow. Probably not as huge deal down south but where we are it poses serious problems in terms of emergency access , general access or even school bus routes. Several more examples come to mind as I'm sure most will have.

    Naturally, the whole discussion of condemnation ensues, but the abridged version is that right-of-way is a sticker.

24. Funding or lack thereof is always #1. Unfunded mandates: Signing and pavement marking reflectivity, new ADA transition plans, etc. Lack of right-of-way.

25. Utilities, utilities and utilities! I can and have had right-of-way clear and money on the bank to perform jobs upwards of $12-$20 million and cannot get off center due to the absolute nonresponsive nature of local utilities relocating their facilities. They use every excuse known under the sun to procrastinate.

26. The three major challenges that I deal with daily as a consultant to communities:
    1. What to do now
    2. What can wait
    3. How to prioritize

27. Road, street, and drainage repairs are split up into so many funds no one fund can do much of anything. The funds should be aggregated and limits need to be more in line with the year to year amount needed to build reserves for the estimated cost of replacement on the life of the street, alley, drain, manholes etc.

    Funds not used should be able to be carried over without fear of having the allocated amount decreased each year. If funds could be built over years fewer projects would require borrowing or bonding and thus decrease costs significantly.

    This is from a small town perspective.

At the current time only small patches can be done with the funds every year to use most of the funds so they will be received again to do the same bandage that never really fixes the problem. It cost big dollars that cannot be accumulated to get in a large grinder and do a proper new surface that would last for many years.

28. How many years do we have to continually do assessment after assessment before anything really gets done. These assessments by our legislators have been done many times. They already have the data and it does not change but get worse for local government.

    The only thing that I will agree with coming from any legislator is; has the county or city exhausted all means available to them to raise money for road improvements. Most counties have but several have not and until then they will do nothing. I have over 25 years experience with this issue. Yes we need help because of declining gas tax revenue. But until each has exhausted all there means to raise revenue they will not do anything.

    We've been asked for 3 other concerns but everything always relates to money. If they had the money they would not have any other real concerns that they could not handle.

Indiana Infrastructure Assessment & Economic Impact

Presented by Indiana Soybean Alliance and Indiana Corn Marketing Council

INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

informa economics
an AGRA informa company

Background

- December 2007 ISA Soybean Summit
- Question "How to get county bridge repaired or replaced?"
- Impact of business to the community
- Consequences of decision
- Why is this important for Agriculture & Rural Communities?

INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

TIAS 9/6/2011

EXHIBIT C

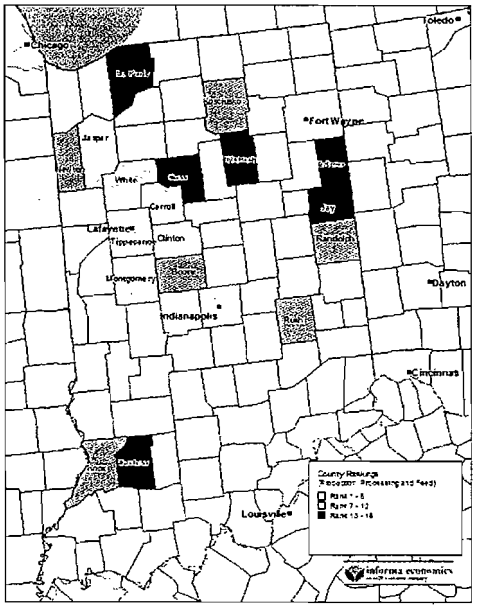
Objectives & Approach

- Develop an understanding of the infrastructure and economic impacts relative to grain movements, biofuels, livestock and agricultural & food processing in Indiana.
- Conduct state-wide baseline analysis, including area of border states
  - Soybeans, Corn, Biofuels, Hogs, Poultry, Beef & Dairy
- Rank all 92 counties
  - Identify top 6 counties for the further in-depth analysis
    - Carroll, Clinton, Jasper, Montgomery, Tippecanoe, White
  - Trends: East Central Indiana & River terminal/Evansville region
- Assess transportation infrastructure and impacts of infrastructure impediments
  - Rail, Road & Bridges, Waterways
  - Interview Indiana Dept. of Transportation and Agribusiness Representatives
- Provide alternatives to enhance transportation requirements and future needs.

INDIANA SOYBEAN ALLIANCE INDIANA CORN Marketing Council

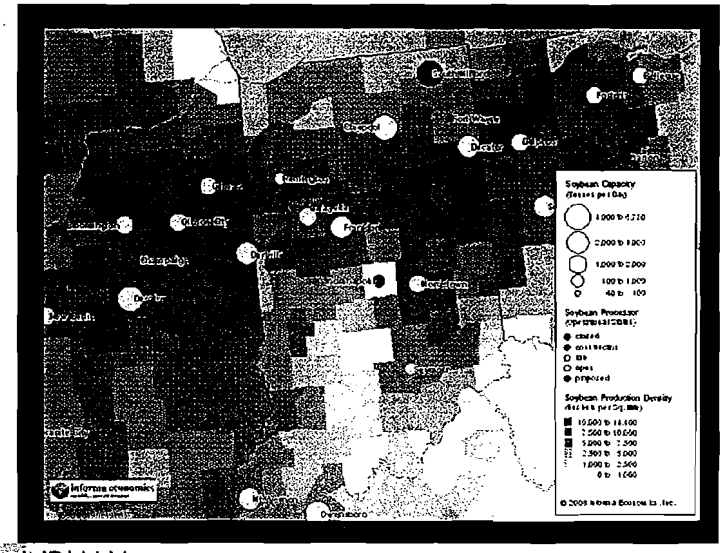
Six Target Counties

1. Carroll
2. Clinton
3. Jasper
4. Montgomery
5. Tippecanoe
6. White



INDIANA SOYBEAN ALLIANCE INDIANA CORN Marketing Council

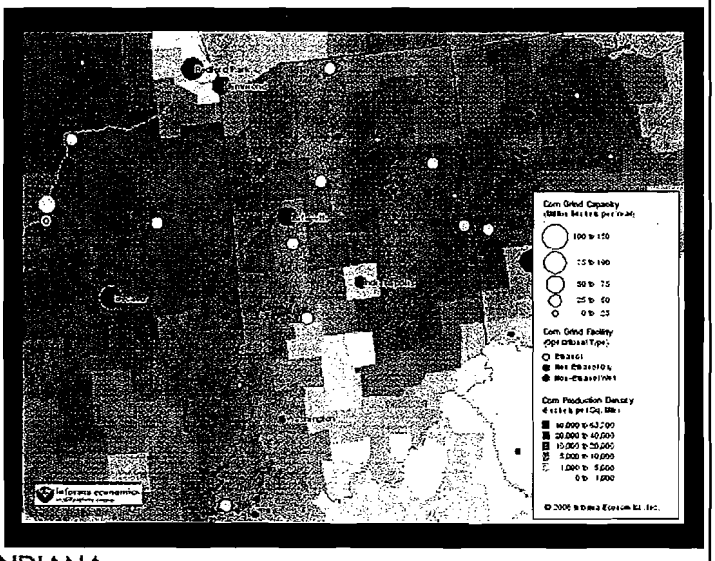
Soybean Production & Processing (IL, IN, OH)



INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

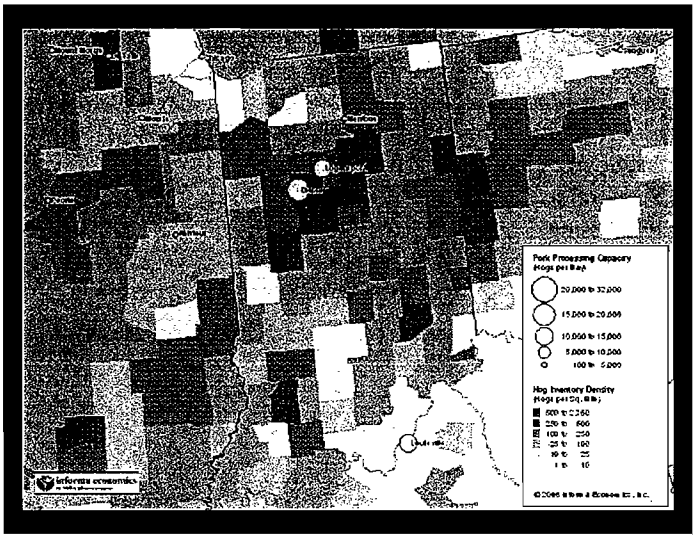
Corn Production, Grind, & Processing (IL, IN, OH)



INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Pork Processing
&Hog Inventory
Density
(IL, IN, OH)

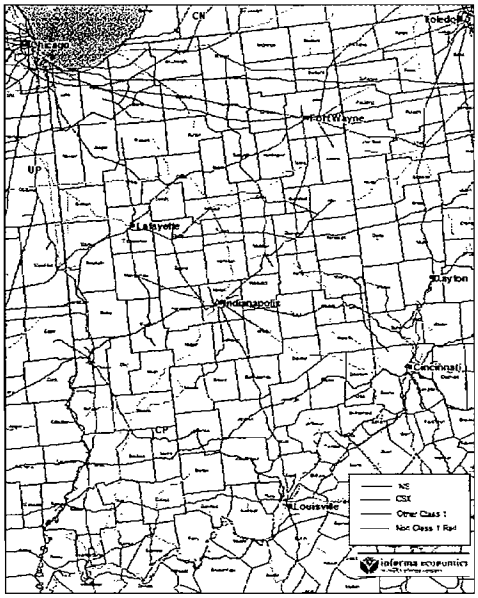


INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Rail Infrastructure

- Four (4) Class I railroads
  - CSX, NS, CP, CN
- Various short line operators
- Overall: six counties are well served
  - 15 unit train loaders
  - 2 unit train side track
    - White County: Excel Co-Op, CSX
    - Carroll County: The Andersons, NS

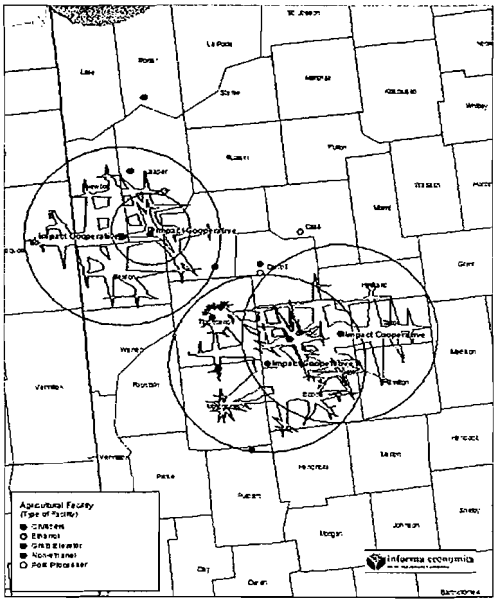


INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Example of Road Adequacy

- 25 mi drive time vs. 25 mi draw area
- The closer the drive time to the center of the area the better

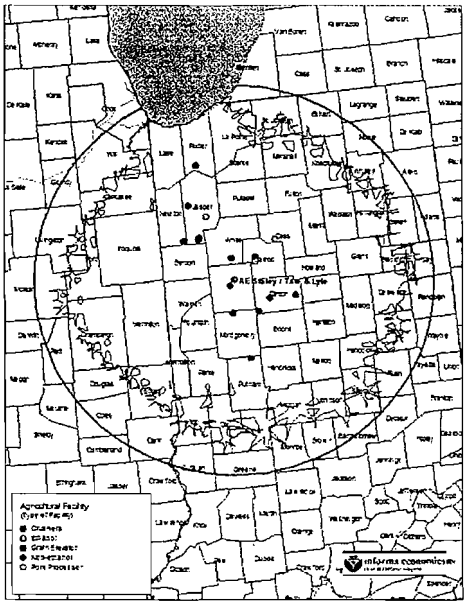


INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Example of Road Adequacy

- 100 mi drive time vs. 100 mi draw area radius
- The larger the draw area the more road alternatives to source.

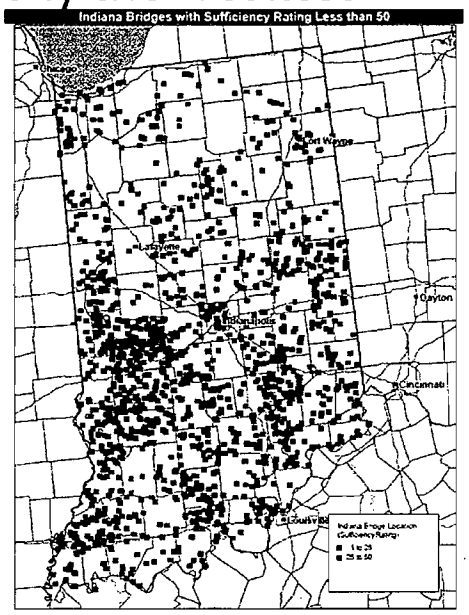


INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Bridge … potentially the weakest link

- Sufficiency Rating 0-100
  - Structural adequacy and safety
  - Serviceability and functional obsolescence
  - Essentiality for public use
- Sufficiency rating < 80 = rehabilitation
- Sufficiency rating < 50 = replacement
- Structurally Deficient - bridge is closed/restricted to light-weight vehicles
- Functionally obsolete – bridge cannot safely service the volume or type of traffic



INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Bridge Deficiencies in Target Counties

	Sufficient		Structurally Deficient		Functionally Obsolete	
Carroll	117	81%	14	10%	11	8%
Clinton	165	78%	27	13%	11	5%
Jasper	162	83%	6	3%	12	6%
Montgomery	213	83%	18	7%	11	4%
Tippecanoe	233	78%	13	4%	17	6%
White	187	89%	14	7%	3	1%
Six Counties	**1,077**	**82%**	**92**	**7%**	**65**	**5%**
State Total	**13,644**	**71%**	**1,975**	**10%**	**2,070**	**11%**

INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Economic Impact of Infrastructure Barriers – Local Elevator Detours

	Alternative Detours (Miles)			
Inputs	**30**		**50**	
Fuel Cost per Gallon	2.50		2.50	
Miles per Gallon	5		5	
Tons per Truck	26		26	
	Corn	**Soybeans**	**Corn**	**Soybeans**
Average Acreage per Farmer	407	277	407	277
Average Yield (bushels per acre)	161.7	49.2	161.7	49.2
Cost Per Trip				
One Way Extra Cost	$ 15.00	$ 15.00	$ 25.00	$ 25.00
One Way Cost per Bushel	$ 0.02	$ 0.02	$ 0.03	$ 0.03
Total Roundtrip Extra Cost	$ 30.00	$ 30.00	$ 50.00	$ 50.00
Roundtrip Cost per Bushel	$ 0.03	$ 0.03	$ 0.05	$ 0.06
Annualized Trip Costs				
Number of Truck Loads per Year	76	15	76	15
One Way Extra Cost	$ 1,139	$ 220	$ 1,898	$ 367
Total Roundtrip Extra Cost	$ 2,277	$ 440	$ 3,796	$ 733

INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Economic Impact of Infrastructure Barriers – Local Elevator Detours

	Alternative Fuel Costs					
Inputs	$3.00		$4.00		$5.00	
Detour in Miles	20		20		20	
Miles per Gallon	5		5		5	
Tons per Truck	26		26		26	
	Corn	**Soybeans**	**Corn**	**Soybeans**	**Corn**	**Soybeans**
Average Acreage per Farmer	407	277	407	277	407	277
Average Yield (bushels per acre)	161.7	49.2	161.7	49.2	161.7	49.2
Cost Per Trip						
One Way Extra Cost	$ 12.00	$ 12.00	$ 16.00	$ 16.00	$ 20.00	$ 20.00
One Way Cost per Bushel	$ 0.01	$ 0.01	$ 0.02	$ 0.02	$ 0.02	$ 0.02
Total Roundtrip Extra Cost	$ 24.00	$ 24.00	$ 32.00	$ 32.00	$ 40.00	$ 40.00
Roundtrip Cost per Bushel	$ 0.03	$ 0.03	$ 0.03	$ 0.04	$ 0.04	$ 0.05
Annualized Trip Costs						
Number of Truck Loads per Year	76	15	76	15	76	15
One Way Cost per Bushel	$ 0.98	$ 0.21	$ 1.31	$ 0.28	$ 1.64	$ 0.35
Roundtrip Cost per Bushel	$ 1.96	$ 0.42	$ 2.62	$ 0.55	$ 3.27	$ 0.69
One Way Extra Cost	$ 912.00	$ 180.00	$ 1,216.00	$ 240.00	$ 1,520.00	$ 300.00
Total Roundtrip Extra Cost	$ 1,824.00	$ 360.00	$ 2,432.00	$ 480.00	$ 3,040.00	$ 600.00
Total Costs Corn & Soybeans	$ 2,184.00		$ 2,912.00		$ 3,640.00	

INDIANA SOYBEAN ALLIANCE

INDIANA CORN Marketing Council

Ideas to Consider

- Each city or rural area, county public works office, and state agency needs to be aware of the economic value of the infrastructure.
- Is there a way to create and maintain an "early warning system" to detect road/rail/bridge problems and speed the repair process? Funds are limited and are often given to projects that are ready.
- In the full report there are examples showing how other states and regions successfully executing collaborations on transportation infrastructure projects.

INDIANA SOYBEAN ALLIANCE INDIANA CORN Marketing Council

Emily Otto-Tice
Director of Production & Environment
eotto-tice@indianasoybean.com
www.indianasoybean.com
www.incorn.org

Indiana Soybean Alliance
Indiana Corn Marketing Council

This study and presentation was made possible and funded by Indiana soybean and corn checkoff dollars.

INDIANA SOYBEAN ALLIANCE INDIANA CORN Marketing Council

PRESENTATION FOR THE INDIANA LEGISLATURE

FEDERAL SURFACE TRANSPORTATION AUTHORIZATION AND FUNDING

Jack Basso
American Association of State Highway and Transportation Officials

Discussion Topics

- America at a crossroads in transportation
- The current climate
  - The Federal budget and revenue is a driving force in future decisions on transportation funding
  - The financial backbone of the Federal highway and transit programs is in critical condition
- Key questions affecting funding:
- What is the Federal government's role going to be in the future?
- How will the Federal government best generate the required revenue for investment?

TIAS 9/6/2011

Ex. D

The Current Climate:

Discussing the Issues

The Current Climate

- Currently the Federal Highway and Transit programs are operating on a short-term extension
- The Administration has outlined a long-term reauthorization proposal with the budget release in February 2011
- However, they have no revenue options identified
- The Highway Trust Fund has required Federal General Fund supplements
- The President called for immediate action to extend the surface transportation programs and is expected to offer further proposals for job creation
- There is no support for increasing user fees (gas tax)

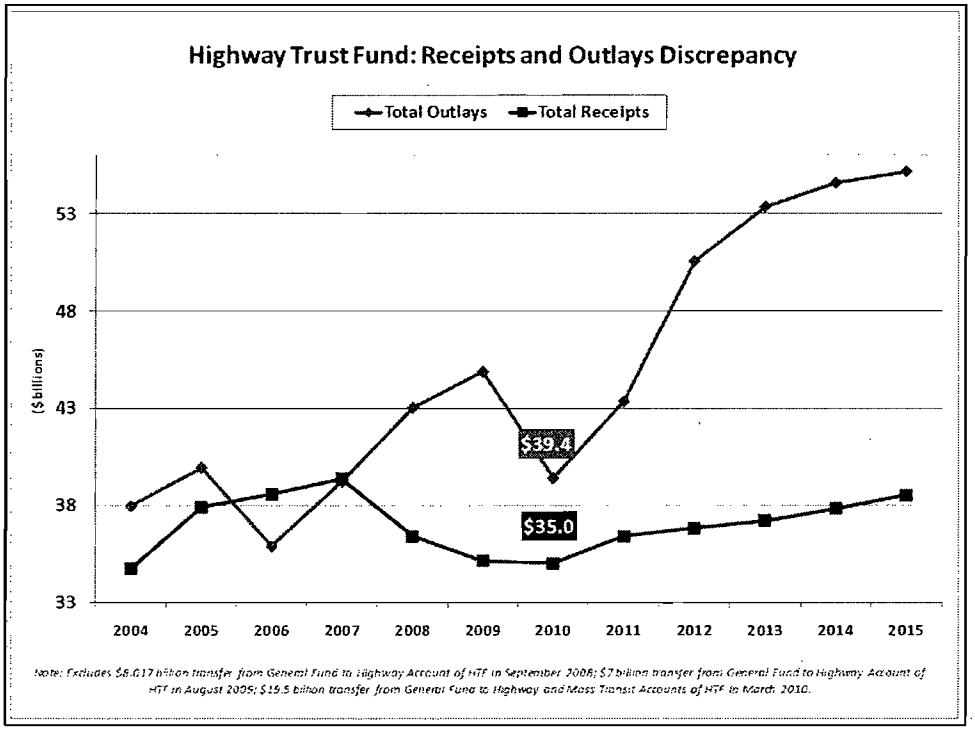
The View From Congress

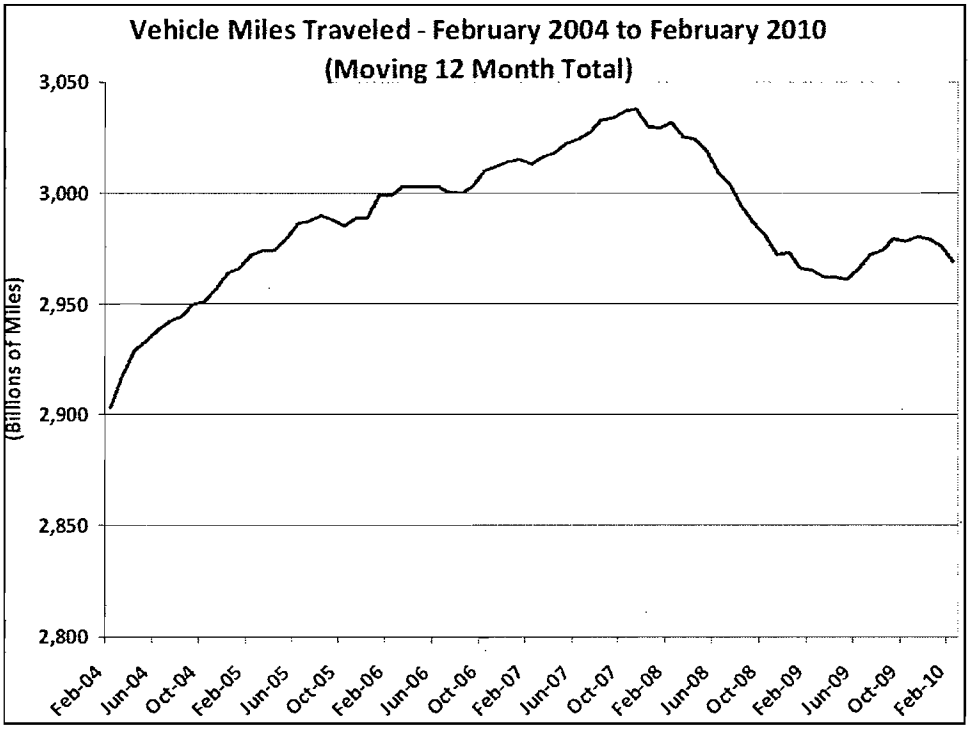
- Facing difficult choices
  - Transportation and Infrastructure Committee of the House of Representatives has developed a bill and released an outline of the legislation
  - The Senate counterpart (EPW) has also released an outline and plans to act on Thursday
  - An extension is needed by the end of the month to be able to continue the program and to be able to collect revenue and pay the States
  - Budget cuts are the order of the day
  - The road ahead is at best unclear

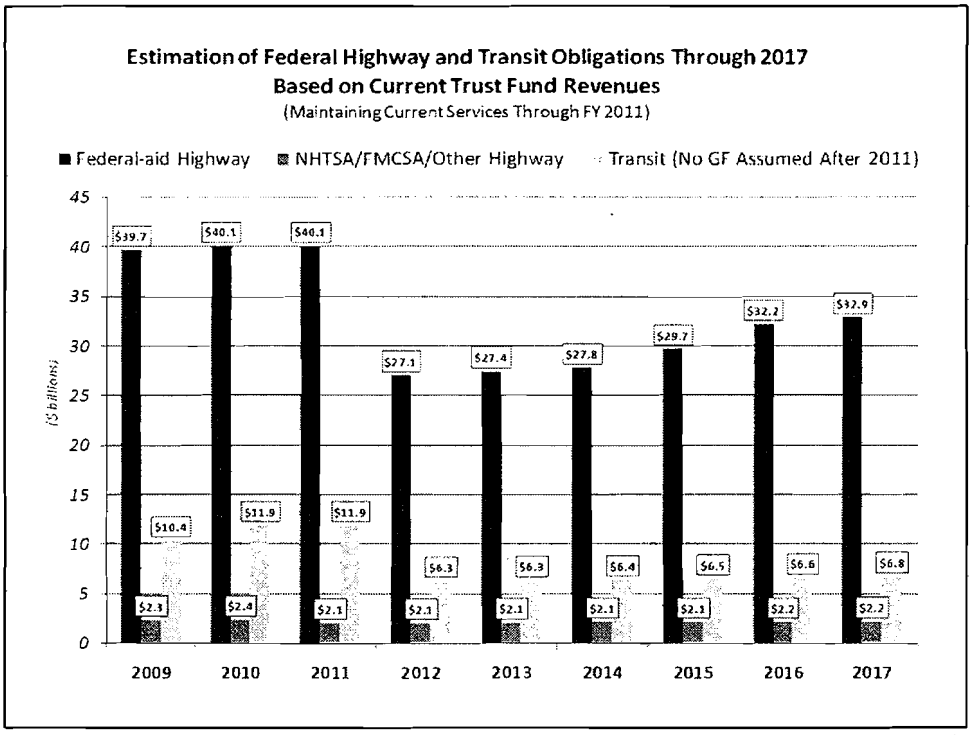
Where We Are Now

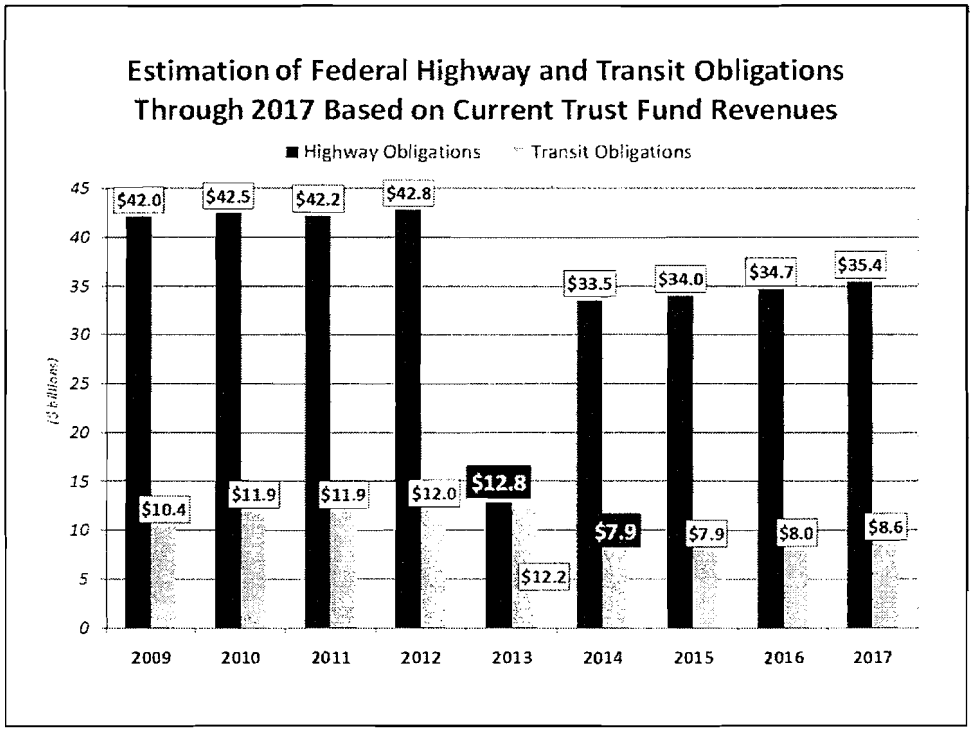
Congress acted to keep the Trust Fund Solvent

- September 2008: $8.017 billion General Fund transfer to the Highway Trust Fund
- August 2009: $7 billion General Fund transfer to the Highway Trust Fund
- September 30, 2009: SAFETEA-LU expired
- March 1, 2010: Highway Trust Fund shutdown for two days
- March 18, 2010: $19.5 billion in foregone interest payments credited to the Highway Trust Fund
- December 31, 2010: Current SAFETEA-LU extension expires
- Fiscal Year 2012: Highway Trust Fund projected to become insolvent


Highway Trust Fund: Receipts and Outlays Discrepancy
Total Outlays
Total Receipts
($ billions)
53
48
43
38
33
$39.4
$35.0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Note: Excludes $8.017 billion transfer from General Fund to Highway Account of HTF in September 2008; $7 billion transfer from General Fund to Highway Account of HTF in August 2005; $15.5 billion transfer from General Fund to Highway and Mass Transit Accounts of HTF in March 2010.


Vehicle Miles Traveled - February 2004 to February 2010
(Moving 12 Month Total)
(Billions of Miles)
3,050
3,000
2,950
2,900
2,850
2,800
Feb-04
Jun-04
Oct-04
Feb-05
Jun-05
Oct-05
Feb-06
Jun-06
Oct-06
Feb-07
Jun-07
Oct-07
Feb-08
Jun-08
Oct-08
Feb-09
Jun-09
Oct-09
Feb-10

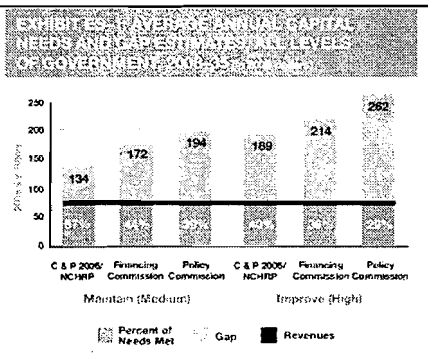

Estimation of Federal Highway and Transit Obligations Through 2017
Based on Current Trust Fund Revenues
(Maintaining Current Services Through FY 2011)
Federal-aid Highway
NHTSA/FMCSA/Other Highway
Transit (No GF Assumed After 2011)
($ billions)
45
40
35
30
25
20
15
10
5
0
$39.7
$40.1
$40.1
$27.1
$27.4
$27.8
$29.7
$32.2
$32.9
$10.4
$11.9
$11.9
$6.3
$6.3
$6.4
$6.5
$6.6
$6.8
$2.3
$2.4
$2.1
$2.1
$2.1
$2.1
$2.1
$2.2
$2.2
2009
2010
2011
2012
2013
2014
2015
2016
2017

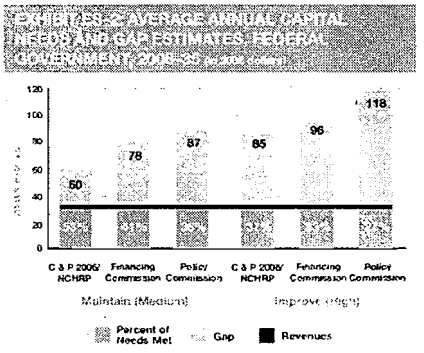

Estimation of Federal Highway and Transit Obligations
Through 2017 Based on Current Trust Fund Revenues
Highway Obligations
Transit Obligations
($ billions)
45
40
35
30
25
20
15
10
5
0
$42.0
$42.5
$42.2
$42.8
$12.8
$33.5
$34.0
$34.7
$35.4
$10.4
$11.9
$11.9
$12.0
$12.2
$7.9
$7.9
$8.0
$8.6
2009
2010
2011
2012
2013
2014
2015
2016
2017

Future Needs and Funding Options

Needs

- Nationally, **meeting only about 1/3 of roughly $200 billion required each year** to maintain and improve the system
- At federal level, also meeting only about 1/3 of needs – **we face a $400 billion federal funding gap over next 6 years** under current policies and revenues





Some Possible Revenue Sources

- Categories
  - Direct revenue-user fees and general tax revenue
    - Includes a variety of transportation related fees
  - Bonding and credit programs
    - Includes tolls and special taxes
  - Public\Private partnerships

Surface Transportation Funding Options Matrix

(all revenue estimates in $ millions)

Funding Mechanisms	Mechanism Yield (2011)		Illustrative Rate	Revenues 2011	Average Revenues 2011-2016	Total Revenues 2011-2016
Annual Drivers License Surcharge	$1.00 Surcharge =	$ 222	$5.00	$ 1,110	$ 1,165	$ 6,998
Annual Highway Miles Traveled Fee (All Light Duty Vehicle	1¢/VMT =	$ 6,538	2.0¢	$ 13,075	$ 13,474	$ 80,843
Annual Highway Miles Traveled Fee (All Trucks)*	1¢/VMT =	$ 977	3.0¢	$ 2,931	$ 3,020	$ 18,120
Annual Registration Fee (Light Duty Vehicles)	$1.00 Fee =	$ 261	$10.00	$ 2,613	$ 2,741	$ 16,448
Annual Registration Fee (Trucks)	$1.00 Fee =	$ 4.4	$15.00	$ 66	$ 66	$ 399
Container Tax	$1 per TEU=	$ 605	$15.00	$ 9,076	$ 10,658	$ 63,946
Dedicated Income Tax - Personal	1% of current taxes =	$ 1,188	1.0%	$ 11,881	$ 11,881	$ 71,288
Dedicated Income Tax - Business	1% of current taxes =	$ 383	1.0%	$ 3,832	$ 4,029	$ 24,172
Diesel Tax Increase	1¢/gal =	$ 386	15.0¢	$ 5,794	$ 6,052	$ 36,309
Diesel Tax Indexing	n/a	n/a	n/a	$ 94	$ 467	$ 2,802
Gas Tax Increase	1¢/gal =	$ 1,379	10.0¢	$ 13,795	$ 14,030	$ 84,183
Gas Tax Indexing	n/a	n/a	n/a	$ 252	$ 1,210	$ 7,257
Harbor Maintenance Tax	0.1% Tax =	$ 1,236	0.5%	$ 6,181	$ 6,581	$ 39,485
HVUT Increase	10% Increase =	$ 97	15.0%	$ 146	$ 169	$ 1,017
Imported Oil Tax	$1.00/Bbls =	$ 4,217	$1.00	$ 4,217	$ 4,356	$ 26,138
Sales Tax on Auto-related Parts & Services	1.0% of Sales =	$ 2,567	1.0%	$ 2,567	$ 2,823	$ 16,938
Sales Tax on Gas	1.0% of Sales =	$ 2,987	8.4%	$ 25,091	$ 30,945	$ 185,671
Sales Tax on Diesel	1.0% of Sales =	$ 868	10.6%	$ 9,198	$ 11,484	$ 68,903
Sales Tax on New Light Duty Vehicles	1.0% of Sales =	$ 2,537	1.0%	$ 2,537	$ 2,571	$ 15,427
Sales Tax on New and Used Light Duty Vehicles	1.0% of Sales =	$ 3,515	1.0%	$ 3,515	$ 3,837	$ 23,021
Share of US Customs Revenues	1% of Receipts =	$ 333	1.0%	$ 333	$ 381	$ 2,288
Tire Tax on Light Duty Vehicles	$1.00 Fee =	$ 1,960	$3.00	$ 5,880	$ 6,168	$ 37,009
Ton Freight Charge -- All Modes	1¢/ton =	$ 164	25.0¢	$ 4,111	$ 4,432	$ 26,592
Ton Freight Charge -- Truck Only	1¢/ton =	$ 113	25.0¢	$ 2,835	$ 3,057	$ 18,340
Ton-Mile Freight Charge -- All Modes	1¢/ton-mile =	$ 43,497	0.5¢	$ 21,748	$ 23,446	$ 140,678
Ton-Mile Freight Charge -- Truck Only	1¢/ton-mile =	$ 12,731	0.5¢	$ 6,365	$ 6,862	$ 41,174
Truck/Trailer Sales Tax Increase	1% of Sales =	$ 219	5.0%	$ 1,095	$ 1,529	$ 9,174
Truck Tire Tax Increase	10% Increase =	$ 33	10.0%	$ 33	$ 48	$ 286
US Freight Bill -- All Modes	1% of Sales =	$ 7,612	1.0%	$ 7,612	$ 8,206	$ 49,236
US Freight Bill -- Truck Only	1% of Sales =	$ 6,608	1.0%	$ 6,608	$ 7,124	$ 42,745
Total Revenues				$ 173,812	$ 192,813	$ 1,156,878

*VMT fee estimates refer to miles traveled on Interstate System

Future Revenue Collection

- The current U.S system relies on fuel taxes
- We have seen a marked decline in revenues
- Two National Commissions have called for short and long-term solutions
- VMT collection systems have come to the forefront of options to consider

15

Legislative Principles

- **Maintain the current federal and state shares for highway and transit capital programs.**
- **Eliminate or drastically limit earmarking in federal transportation programs.**
- **Develop policies that support maximum flexibility to allow for use of both conventional and innovative funding and financing tools.**

Summary Considerations

- We are at a crossroad
- Congress and the Administration face difficult choices
- State and local governments will be affected by funding choices
- The nation will either benefit from our actions, or be changed in negative ways
- The future is really now

QUESTIONS ?

Jack Basso

Email: jbasso@aashto.org
Phone: +1-202-624-3508

Transportation Challenges for Cities and Towns

Tom DeGiulio,
Town Manager, Munster
Rhonda Cook,
Director of Government Affairs and Legislative Counsel, IACT

Responsibility

- Counties, cities and towns maintain nearly 90 percent of all public roadways in Indiana
- In 2009, Indiana LTAP estimated that the funding shortfall for local agencies was $5.4 billion. It was estimated that this amount was needed to address the backlog of needs that have accumulated as facilities have deteriorated over time

TIAS 9/6/2011
EXHIBIT E

Challenge

- Decreased road and street funding
- Increased cost for materials, labor and equipment
- Increased amount of roads and streets to maintain
- Need for new infrastructure and transit systems beyond maintenance of current roads and streets

New Construction v. Maintenance

- Building a new infrastructure is initially a one time cost
- Maintenance of the infrastructure is the real concern

Snapshot – Funding Then and Now

- Marion, Indiana

  2000
  - $1,679,703 received in MVH/LRS revenue

  2010
  - $1,161,596 received in MVH/LRS revenue

(Decrease of $518,107)

Snapshot – Funding Then and Now

- Goshen, Indiana

  2000
  - $978,501 received in MVH/LRS revenue

  2010
  - $1,008,910 received in MVH/LRS revenue

(Increase of $30,409 in 10 years; $1500 increase per year; annual increase of less than 0.2%)

Snapshot – Cost Increases Over the Last 10 years

Example: Contractor's Costs - Munster

	2001	2011	% of change
Asphalt (Binder) per ton	$29.00	$55.50	91.38%
Asphalt (Surface) per ton	33.45	62.70	87.44%
Gasoline per gal	1.34	3.95	194.78%
Diesel per gal	.79	3.47	339.24%
Labor Costs including benefits per hour			
Operating Engineer – base rate	37.62	62.65	66.53%
Common Laborer – base rate	24.05	39.03	62.29%
Teamster – base rate	31.22	47.77	53.01%
Trucking Costs	61.00	98.00	60.66%

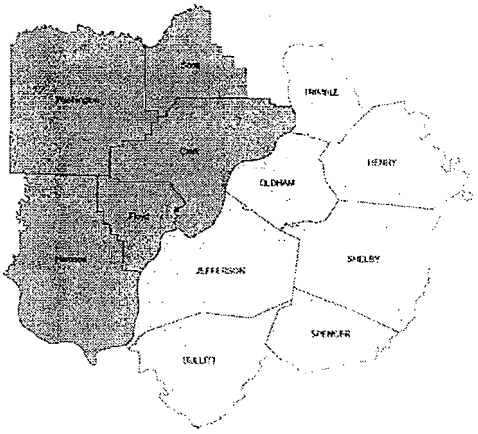
Snapshot – Cost Increases Over the Last 10 years

Example: Goshen

	2000	2010	% of change
HAC surface (asphalt) laid	$33.75	$67.00	98.5%
Road salt per ton	32.31	62.43*	93.3%
Sand per ton	3.60	6.15	70.8%
Hot patch material per ton	26.75	50.00	86.9%
A standard sign post	10.32	21.94	112.6%
Paint for Streets per gal	8.34	12.65	51.7%
Diesel Fuel per gal	1.27	2.49	96.1%
Light Equipment Labor per hour	10.97	15.17	38.3%
Family Health Insurance Policy	8,945	14,648	63.8%
1-ton single axle dump/plow truck	82,500	135,000	63.6%
PERF paid by city	6.0%	8.75%	45.7%

*using state cooperative purchasing program for road salt

Snapshot – Kentuckiana



Snapshot – Kentuckiana

The American Society of Civil Engineers ranked infrastructure in a 2010 report.

- Bridges – Grade: D (Poor)
  - Indiana counties in the area have 154 bridges that are either structurally deficient or functionally obsolete.
- Roads – Grade: D (Poor)
  - Delay and congestion in Kentuckiana has outpaced similar growth in metro areas of similar size. Poor pavement conditions costs motorists an additional $391 in operating costs a year.
- Transit – Grade: D+
  - More dedicated funding to mass transit is recommended.

Main Revenue Sources

- **Gas tax revenue – MVH/LRS**
  - It was intended for roads and streets, but state legislature has shifted a portion of this money for other purposes – funding the state police and BMV
- **Wheel tax/Motor Vehicle Excise tax revenue**
  - Adopted at the county level, therefore cities and towns do not have the authority to adopt the tax
- **Cum Funds / General Obligation Bonds (cities and towns only)**
  - Reliance on property taxes as a road and street revenue stream is more difficult now because of the tax caps
  - Controlled projects are subject to petition remonstrance or referendum

State Decisions Have Tied Local's Hands to Help Themselves

- 1) Diversion of road and street money to state police and BMV
- 2) Property tax caps
- 3) Specifying the uses of MVH and LRS monies instead of allowing dollars to be used interchangeably
- 4) Requiring locals to subsidize the state for street sweeping of state highways and upkeep

MVH Revenue Diverted

July 1, 2009-June 20, 2010

MVH Gross Receipts	$695,138,758
State Police/BMV	$145,197,276
Available for Distribution	$540,627,234

Net Distributions:

- INDOT $273,787,020
- Counties $181,446,707
- Cities and Towns $ 85,393,507

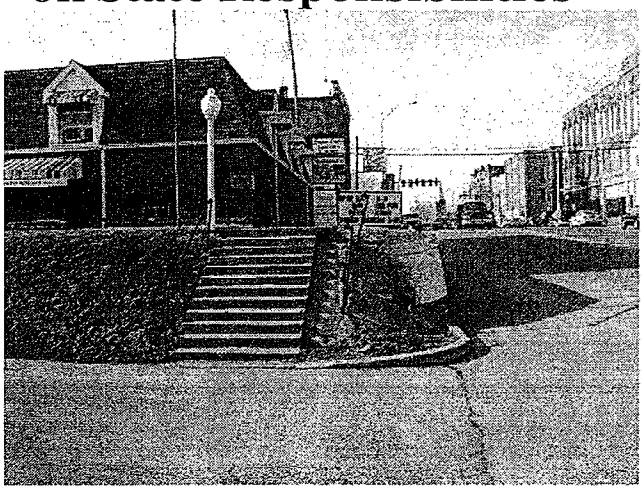
Free-up Local Dollars that are Spent on State Responsibilities

Example:

- Delphi, Indiana
  - The City has been requesting maintenance to sidewalks and steps belonging to the state for years. The City has been forced to use its funds to subsidize the state in order to maintain areas that are unsafe. This reduces the money locals have to spend on areas for which they are responsible.

Free-up Local Dollars that are Spent on State Responsibilities

Free-up Local Dollars that are Spent on State Responsibilities



Free-up Local Dollars that are Spent on State Responsibilities

- The City of Delphi spent $60,000 to repair the state's dangerous steps and sidewalks at the cross roads of U.S. 421 and St. Rd. 25.
- The City of Delphi receives just over $100,000 of MVH and LRS money per year.

Free-up Local Dollars that are Spent on State Responsibilities

Free-up Local Dollars that are Spent on State Responsibilities

Street Sweeping

- In 2011, one of IACT's legislative initiatives was to get equitable reimbursement from the state for street sweeping of state highways.
- The state contracts with local governments for this maintenance which is important in keeping sewers from clogging and insures proper drainage.
- The reimbursement rate for street sweeping has not increased in 23 years (since 1988).
- A handful of mayors met with INDOT on December 14, 2010 and were told to pursue change administratively rather than legislatively.
- After studying the issue and gathering data, IACT submitted a proposal to INDOT on March 21, 2011 for increased reimbursement. IACT has had no response from INDOT to date.

Free-up Local Dollars that are Spent on State Responsibilities

Street Sweeping:

- State pays annual amount of $300 per curb mile
- **IACT proposes $180 per curb mile *per sweep***
- Actual annual cost of street sweeping is $423-$2000 a year depending on frequency of sweeping
- *EXAMPLE:* In South Bend, the cost to local government to pay landfill, tipping and environmental fees for dumping the debris collected from sweeping the state highways costs more than the total amount the state provides annually under the street sweeping contract; therefore, the local budget is subsidizing the state for the equipment, fuel, labor and landfill costs for maintaining the state highways.

2012 IACT Initiative: Allow MVH and LRS Revenues to be Used Interchangeably

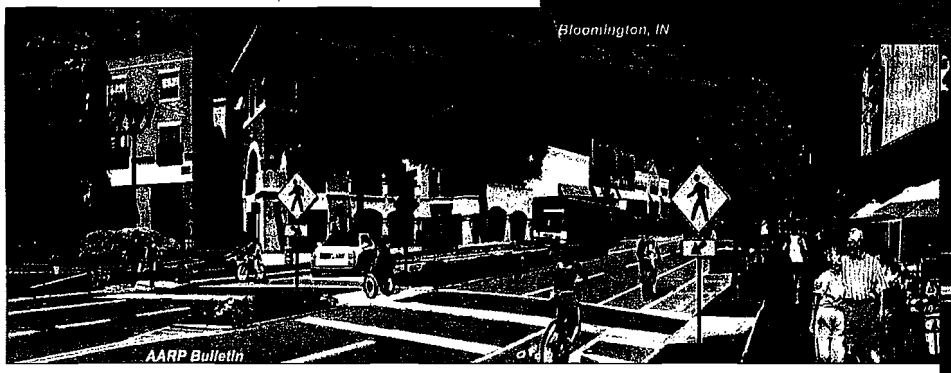
- Change has no fiscal impact.
- Ease cities and towns administrative burden of keeping separate accounts and give locals more flexibility to manage our shrinking resources.
- MVH: IC 8-14-1-5 >> monies may be used for construction, reconstruction, repair, maintenance, oiling, sprinkling, snow removal, weed and tree cutting and cleaning of their highways as herein defined, and including also any curbs, and the city's or town's share of the cost of the separation of the grades of crossing of public highways and railroads, the purchase or lease of highway construction and maintenance equipment, the purchase, erection, operation and maintenance of traffic signs and signals, and safety zones and devices; the painting of structures, objects, surfaces in highways for purposes of safety and traffic regulation; law enforcement purposes subject to limitations; and for pay payment of principal and interest on bonds sold primarily to finance road, street, or thoroughfare projects.
- LRS: IC 8-14-2-5 >> monies may be used for engineering, land acquisition, construction, resurfacing, maintenance, restoration, or rehabilitation of both local and arterial road and street systems; the payment of principal and interest on bonds sold primarily to finance road, street, or thoroughfare projects; any local costs required to undertake a recreational or reservoir road project under IC 8-23-5; or the purchase, rental, or repair of highway equipment.

Complete Streets for the Crossroads of America: the Indiana Complete Streets Campaign

Complete streets are designed and operated to enable safe access for all users – pedestrians, bicyclists, motorists, and public transportation users of all ages and abilities – in moving along and across roadways.

The Benefits of Complete Streets include:

- Improved safety
- Potential for economic development
- Opportunities for walking and biking
- Reduced traffic congestion
- Access for children, older adults, and the disabled
- Improvements in air quality
- A comprehensive, integrated transportation network
- Wise fiscal investments



Complete Streets Policies:

- Institutionalize decision-making and ensure that the entire right of way is routinely designed and operated to enable safe access for all users.
- Include a vision for how and why the community wants complete streets
- May be public (legislation, ordinances, resolutions, executive orders) or internal (policies, plans, manuals).
- Occur at all levels of government: Local, MPO, State, Federal
- Use the latest and best design standards while recognizing the need for flexibility in balancing user needs.

Learn More and Take Action

More than 120 jurisdictions across the country have adopted Complete Streets policies

In Indiana, the Bloomington/Monroe County Metropolitan Planning Organization and the Madison County Council of Governments have.

Statewide legislation was introduced in the 2010 General Assembly

Additional local and MPO policies are forthcoming around the state

Please join and support this effort!

Complete streets are appropriate in all communities, regardless of size or setting; each complete streets is unique.

Complete street elements include: sidewalks, bike lanes, special bus lanes, comfortable and accessible transit stops, frequent crossing opportunities, median islands, accessible pedestrian signals, curb extensions, and more.

www.healthbydesignonline.org
www.completestreets.org

AARP

bicycle indiana

Health by Design
creating built environments to foster healthy living
an ALLIANCE FOR HEALTH PROMOTION initiative

APA IN

Hoosier Environmental Council
All. Together. Now.

TIAS 9/6/2011
Ex. F

RP Indiana
w.aarp.org/in

ılth by Design
w.healthbydesignonline.org

ɔsier Environmental Council
w.hecweb.org

ycle Indiana
w.bicycleindiana.org

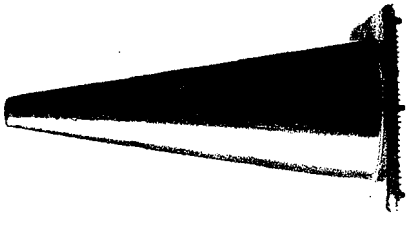
erican Planning Association/
iana Chapter
w.indianaplanning.org

e need to provide people with
nsportation choices in order
get to work, school, shops
d medical visits, and to take
't in social, civic and volunteer
:ivities. We need to change old
ıd building habits so that road
ɔjects consistently take into
count the needs of everyone
ng the roads. By completing our
ıd network for all travelers, we
l improve safety, help reduce
tomobile emissions, and provide
portunities for physical activity."

The Complete Streets Act of 2009

AARP Indiana
One N. Capitol Avenue, Suite 1275
Indianapolis, IN 46204

AARP



Introducing Indiana's Complete Streets Campaign

Help us improve safety and access for all

AARP®

HEALTH / FINANCES / CONNECTING / GIVING / ENJOYING

Complete Streets Form a Sustainable, Livable Community

A Complete Street is safe, comfortable and convenient for travel by automobile, foot, bicycle, and transit regardless of age or ability.

Complete Streets Spark Economic Revitalization

In a small town or large urban area, street design that is inclusive of all modes of transportation, where appropriate, not only improves conditions for existing business but also is a proven method for revitalizing an area and attracting new development.

Complete Streets boost the economy by increasing property values. Transportation options mean employees have more ways to get to work. The tax base is increased, and there is more financial stability for homeowners and business owners. Complete Streets are a sound financial investment in communities by providing long-term savings.

Complete Streets Mean Safer Streets

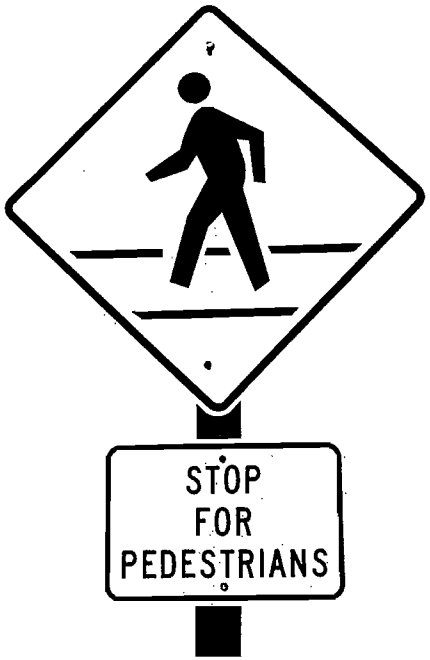
Without safe places to walk, cross a street, catch a bus or bicycle, people are at risk. Designing streets with ALL users in mind improves pedestrian safety according to a Federal Highway Administration review. All road users—motorists, pedestrians, and bicyclists—benefit from slower speeds and better design.

"In a poll for AARP, 40 percent of adults age 50 and over said the sidewalks in their neighborhoods are inadequate. Nearly 50 percent reported they cannot cross main roads close to their home safely, yet half of them would walk, bicycle or take a bus more often if the problems were fixed. Mobility activists assert that the best way to address these problems is with "Complete Streets" policies which mandate that pedestrians, bicyclists and those who use public transportation can share the road safely and comfortably with automobiles."

AARP Bulletin Today, May 14, 2009

Complete Streets Promote Health, Civic and Social Involvement

Complete Streets offer more choices of travel—car, safe and active working and bicycling. More physical activity reduces obesity rates. Citizens out and about in their communities interact more with each other, the businesses around them and their neighborhood. Complete Streets promote a healthier lifestyle. People have more active mobility choices. The community is sustained by the connected and alternative forms of travel and route options.



Implementing Complete Streets
A Minnesota Overview

Bernie Arseneau – MnDOT Deputy Commissioner / Chief Engineer – September 6, 2011

Your Destination... Our Priority

Understanding Complete Streets

Complete Streets are designed and operated to enable safe access for all users ... motorists, transit users, pedestrians and bicyclists of all ages and abilities are able to move safely along and across complete streets.

TIAS 9/6/2011

EXHIBIT G

Origins of Complete Streets

- **Problems:** Nearly 5,000 pedestrians & bicyclists killed and more than 70,000 injured annually on US roads (2004 *Mean Streets* publication) and 1/3 of US population cannot or does not drive a car
- **Emergence:** Americans with Disabilities Act of1990 and Title II Act of 1992 requirements as applied to state and local government programs and services
- **Emergence:** The current movement toward Complete Streets has grown since Federal Reauthorization Act TEA-21 in 1999 and US DOT issued policy statements and design guidance in 2000 for integrating bicycle and pedestrian facilities and travel
- **National Complete Streets Coalition:** A broad coalition of transportation associations, realty associations, advocates for the disabled & elderly, health & private industry representatives and walking & bicycling organizations (etc.) that emerged in 2003

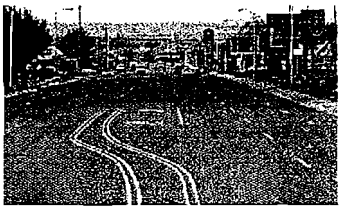
Expected Benefits of Complete Streets

- **Improved pedestrian, bicyclist, transit user & motorist safety**
- **Improved mobility & access for the large segment of the US population that cannot or does not drive a car**
- **Improved public & environmental health**
- **Increased modal options that combat congestion while improving transportation capacity & mobility**
- **Increased consumer savings & property values**
- **Increased economic activity & competitiveness**
- **Improved quality of life through more livable & sustainable transportation , communities, commerce & growth**

National Complete Streets Status

2000 US DOT Guidance:

Bicycling and walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist

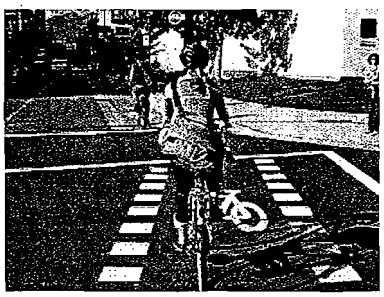


The guidance has not been fully embraced by many jurisdictions

National Complete Streets Status

New 2010 US DOT Guidance

On March 15, 2010, US DOT Secretary Ray LaHood announced a new policy related to "complete streets" placing planning for bicycling & pedestrians on equal footing with the planning of highways and transit.



US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations & Recommendations are posted on FHWA's website at :
http://www.fhwa.dot.gov/environment/bikeped/policy_accom.htm

National Complete Streets Status

2010 US DOT Policy Recommendations

- Treat walking and bicycling as equals with other transportation modes
- Ensure convenient access for people of all ages and abilities
- Go beyond minimum design standards
- Collect data on walking and biking trips
- Integrate bicycle and pedestrian accommodation on new, rehabilitated and limited-access bridges
- Set a mode share target for walking and bicycling
- Protect sidewalks and shared-use paths the same way roadways are protected (maintenance, snow removal, etc.)
- Improve non-motorized facilities during maintenance projects

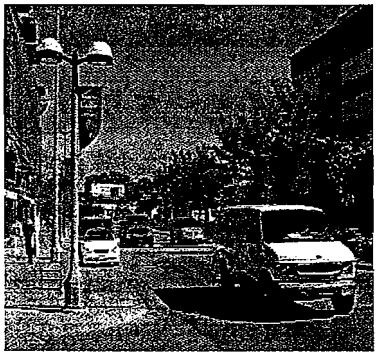
Minnesota Complete Streets Status

2008 Law - Complete Streets Feasibility Study

In 2008, the MN Legislature enacted:

Laws 2008, Chapter 350, Article 1, Section 94. COMPLETE STREETS.

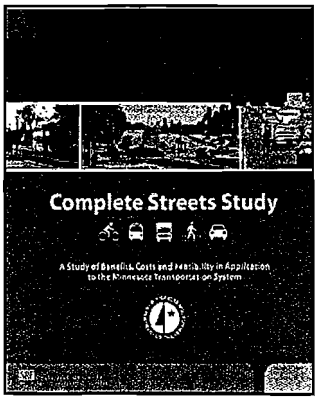
The Commissioner of Transportation, in cooperation with the Metropolitan Council and representatives of counties, statutory and home rule charter cities and towns, shall study the benefits, feasibility and cost of adopting a complete streets policy applicable to plans to construct, reconstruct and relocate streets and roads ...



Minnesota Complete Streets Status

2009 Complete Streets Feasibility Study

The Commissioner was required to report the findings, conclusions , and recommendations to the Senate Transportation Budget and Policy Division and the House Transportation Finance Division and Transportation and Transit Policy Subcommittee by December 5, 2009.



MnDOT's State Aid Division was responsible for managing the study and work by SRF Consulting Group and internal and external stakeholders serving on a Project Management Team, Advisory Committee and a Technical Advisory Panel.

The Report can be found at: www.state.mn.us/planning/completestreets

Minnesota Complete Streets Status

2009 Complete Streets Feasibility Study Findings

- Implementing Complete Streets Policy is feasible at the state level
- Comprehensive planning and modal network connectivity offer the best opportunities for cost-effectiveness and success
- Collaboration across jurisdictions, early planning coordination, and flexibility in design are critical to achieving Complete Streets success
- Planning and design guidelines need to be updated and aligned
- In urban areas, space allocation is a bigger concern than capital costs
- Operations / maintenance costs are bigger concerns than capital costs

Minnesota Complete Streets Status

2009 Complete Streets Feasibility Study Findings

- Complete Streets implementation is easier if all levels of government are involved and policy is developed by stakeholders
- Complete Streets is inherent to applying the philosophy and principles of CSS
- Complete Streets require the application of flexibility in planning and design
- Complete Streets benefit to cost data is not typically available or documented

Marshall Ave / Lake Street Bridge in the Twin Cities

Minnesota Complete Streets Status

Complete Streets Feasibility Study Recommendations

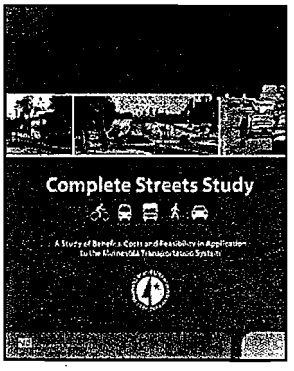
- Support MnDOT's commitment to partner with a broad coalition in building on existing CSS practices to develop and implement a Complete Streets policy
- Review & reconcile contradictions in planning & design policies, guidelines & manuals
- Explore feasibility of integrating Complete Streets guidance into one MnDOT manual
- Integrate Complete Streets in MnDOT's new scoping model and process
- MnDOT should serve as a resource to assist local governments & agencies (to understand funding sources & constraints and to develop local policies & approaches)
- All agencies should develop an integrated transportation plan addressing connectivity for all modes and users of all ages and abilities
- Review the State Aid design variance process to make it more accessible & transparent

Minnesota Complete Streets Status

Complete Streets Feasibility Study Recommendations

Complete Streets does not mean "all modes on all roads" as the "goal" but it does mean:

- Develop a balanced transportation system integrating all modes via planning inclusive of each mode
- Provide for all surface modes and users of all ages and abilities ... motorists, freight, transit riders, bicyclists and pedestrians



Minnesota Complete Streets Status

Subsequent MnDOT Direction & Commitment

MnDOT made a commitment to partner with a broad coalition to build upon its approach to Context Sensitive Solutions in developing and implementing a Complete Streets vision & policy for its road system.

MnDOT's State Aid Division is providing the leadership in the partnership.

An external advisory group is advising MnDOT on the Complete Streets work planning and implementation efforts.

Minnesota Complete Streets Status
Partnering with MnDOT - External Advisory Group

- ADA of Minnesota
- Association of MN Counties (2)
- Builders Association of Minnesota
- MN Association of Townships
- MN Complete Streets Coalition (6)
- MN Dept of Employment and Economic Development
- MN Federal Highway Administration
- MN Dept of Health
- MN Housing Finance Agency
- MN Dept of Natural Resources
- MN Legislature
- MN Pollution Control Agency
- MN Dept of Public Safety
- MN Public Transit Association
- MN Transportation Alliance
- League of MN Cities (2)
- Metro Transit
- Metropolitan Council (MPO)
- West Central Initiative (RDC)
- Hennepin County
- City of Rochester

Minnesota Complete Streets Status
2010 MN Complete Streets Legislation

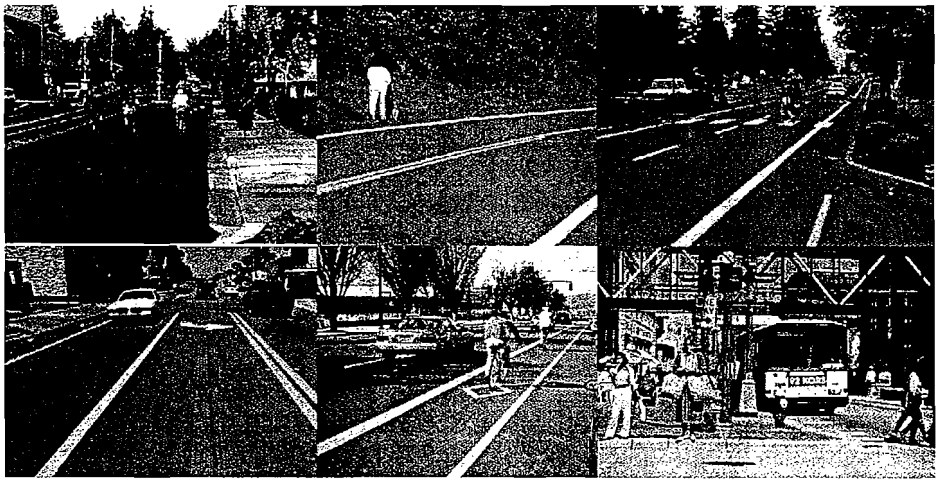
Complete Streets legislation was also part of a transportation policy bill signed into law in Minnesota on May 15, 2010.

The legislation supports MnDOT's efforts to lead a statewide partnership approach for implementing Complete Streets.

The commissioner shall implement a complete streets policy after consultation with stakeholders, state and regional agencies, local governments, and road authorities. The commissioner shall address relevant protocols, guidance, standards, training and requirements and shall integrate related principles of context sensitive solutions.

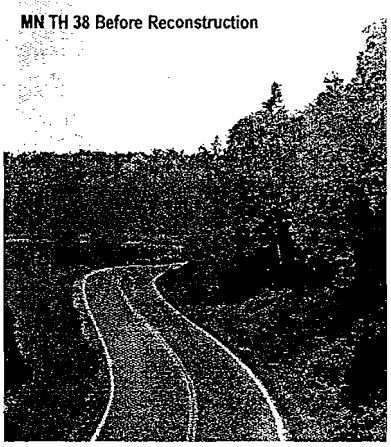
Complete Streets Come In Many Forms

For Many Circumstances, Constraints & Opportunities



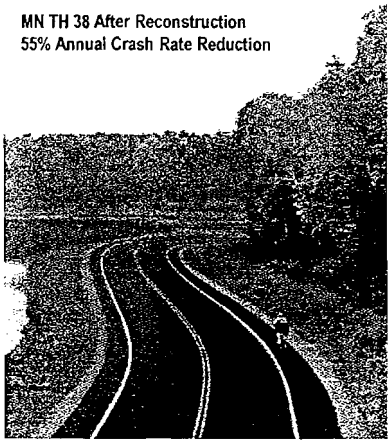
Complete Streets Comparisons - Rural

MN TH 38 Before Reconstruction



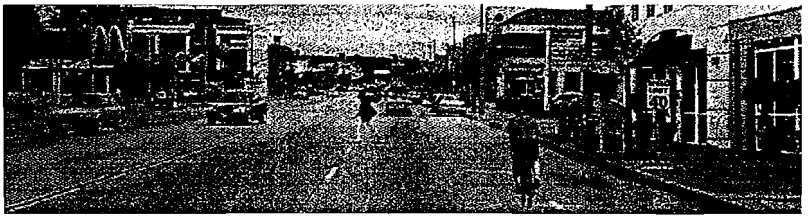
Not a Complete Street

MN TH 38 After Reconstruction
55% Annual Crash Rate Reduction



More of a Complete Street

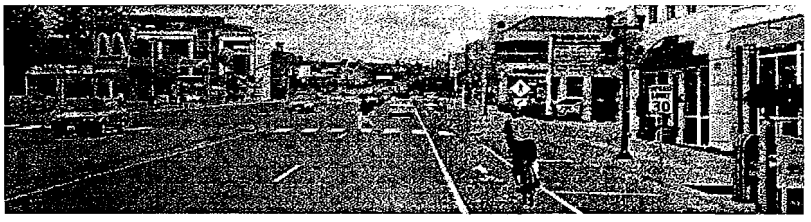
Complete Streets Comparisons - Urban



Does this Existing Condition Appear to be a Complete Street?

Is this More of a Complete Street within the Existing Footprint?

Complete Streets Comparisons - Urban



Is this More of a Complete Street within the Existing Footprint?

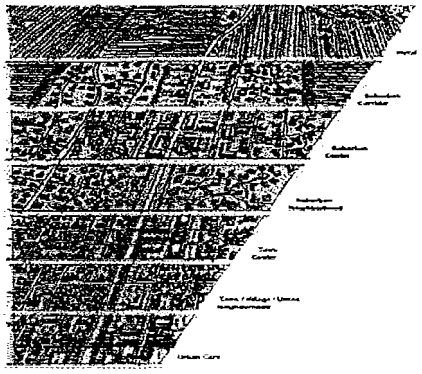
Is this More of a Complete Street within the Existing Footprint?

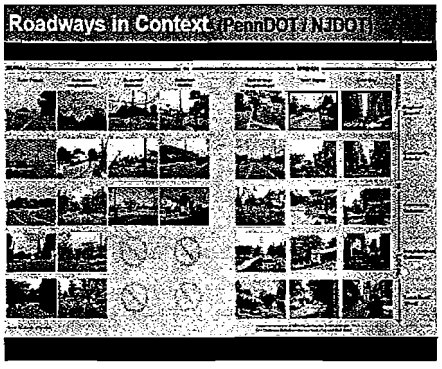
Planning & Guidance Challenges

Balancing Surface Transportation Systems by Integrating All Modes as the Goal via Planning Inclusive of Each Mode

Planning & Guidance Challenges

Leveraging Development and Redevelopment so Land Use and Transportation Become More Mutually Supportive in Design & Function





Re-examining: Multi-functional Arterials...Context Zones...Design Values

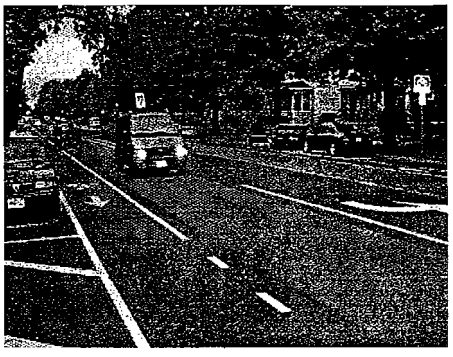
Allocation Of Space Challenges

How Much Space Do You Need and For What?

Exploring Flexibility in Design to Balance Competing Objectives and Optimize the Return Upon Investment

Operations & Maintenance Challenges

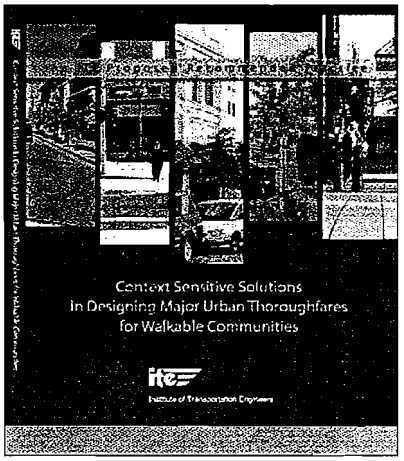
Complete Street in Summer

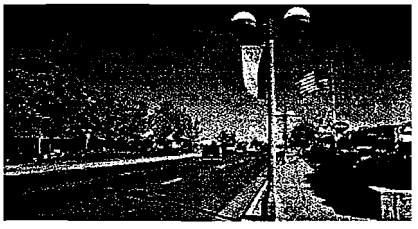


How About in Winter?

Multimodal Operations & Maintenance Needs are Year-Round

Excelsior Blvd Case Study in St. Louis Park, MN

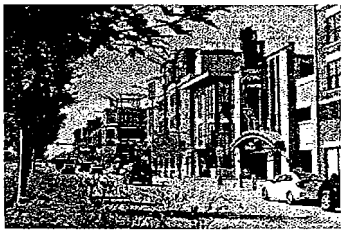


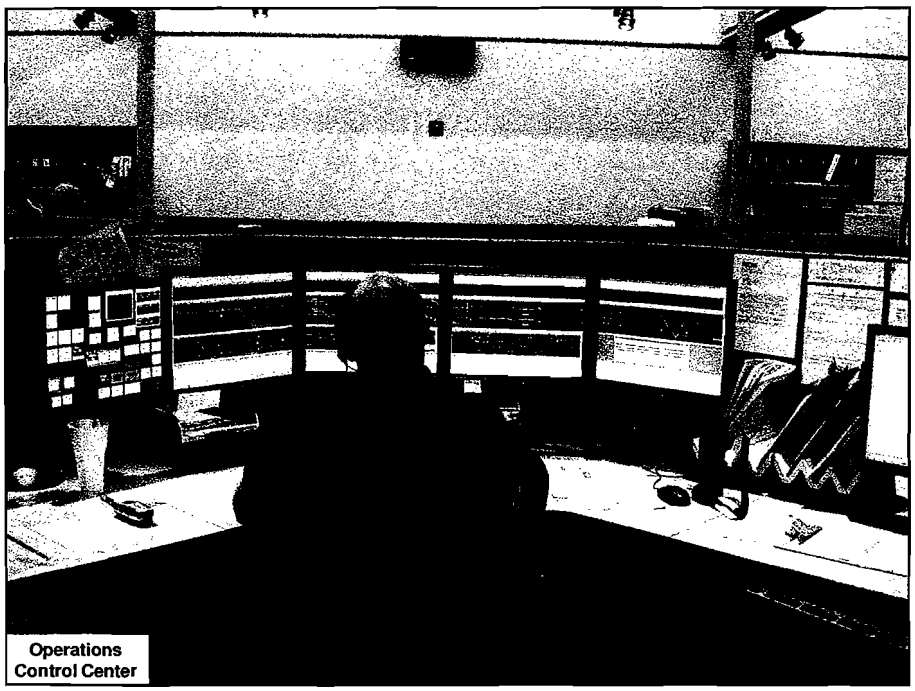


(1 of 5) Case Studies in ITE's 2006 Proposed Recommended Practice Publication

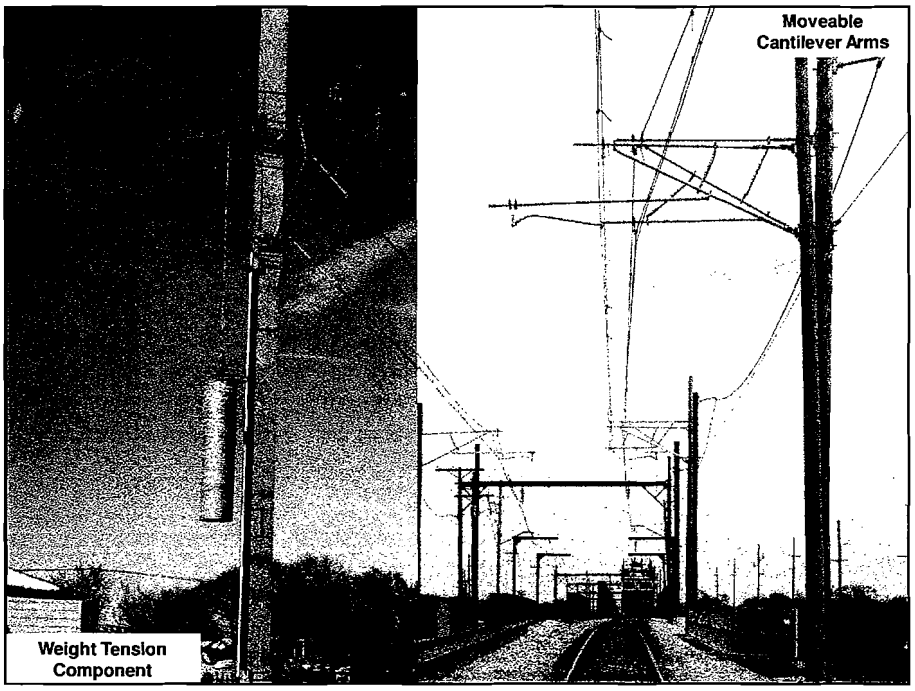
Excelsior Blvd Case Study in St. Louis Park, MN

- Excelsior Blvd reconstruction (St. Louis Park) contributing to a revitalized 1st ring suburban avenue and redevelopment ... more mutually supportive land use & transportation planning & development
- A vibrant new mix of civic uses, housing, sustainable retail and a town center ... drawing new people and businesses for mixed-use & transit-oriented development
- Demonstrating flexibility in design with a 4-lane minor arterial carrying 19,000+ ADT including lowered design speed, reduced lane widths, reduced left turn lane lengths, improved access controls, curb bump-outs, raised and landscaped medians, widened sidewalks, near and far side transit stops, north and south off-route bicycle routing ...





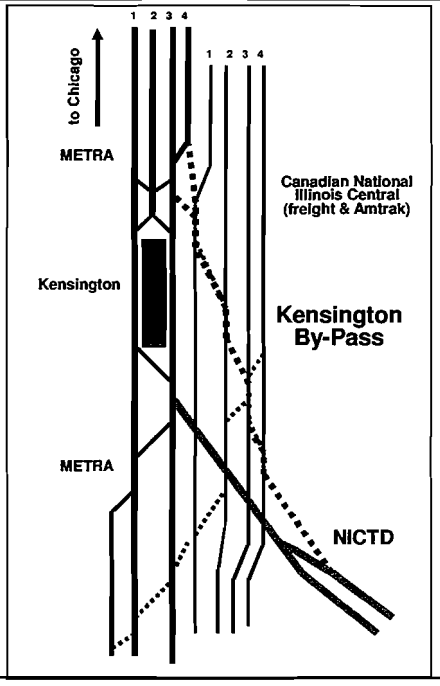
Operations Control Center



Weight Tension Component

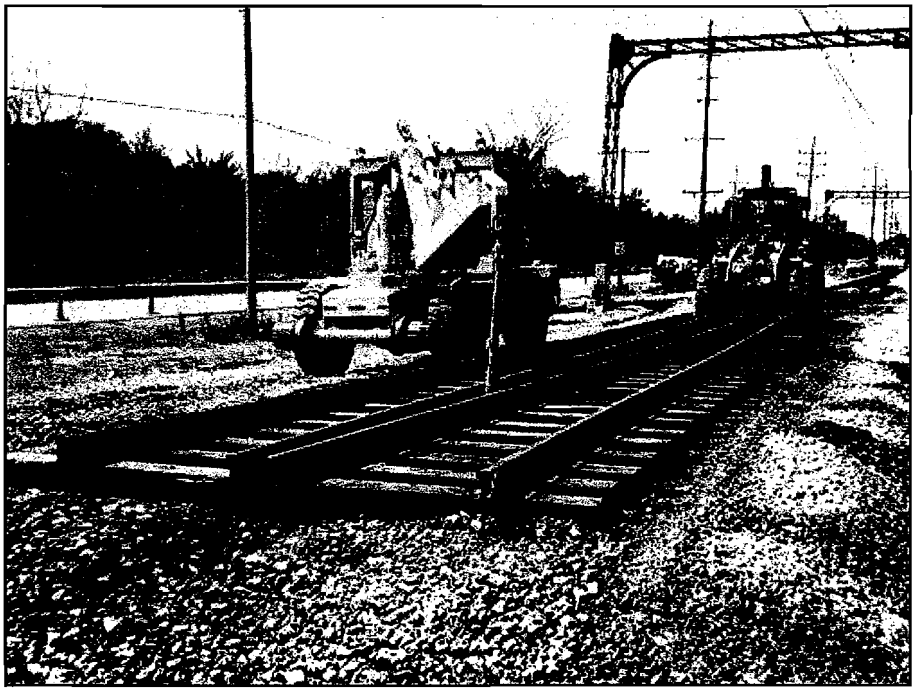
SOUTH SHORE IMPROVEMENTS

- Enhancing safety
  - Reducing grade crossings
  - Implement Positive Train Control
- Improve Reliability
  - Centralized Train Control (complete this year)
  - Catenary renewal program (complete thru Phase 2 – Phase 3 unfunded South Bend to Mich City)
- **Improve Capacity**
  - **Kensington By-Pass**



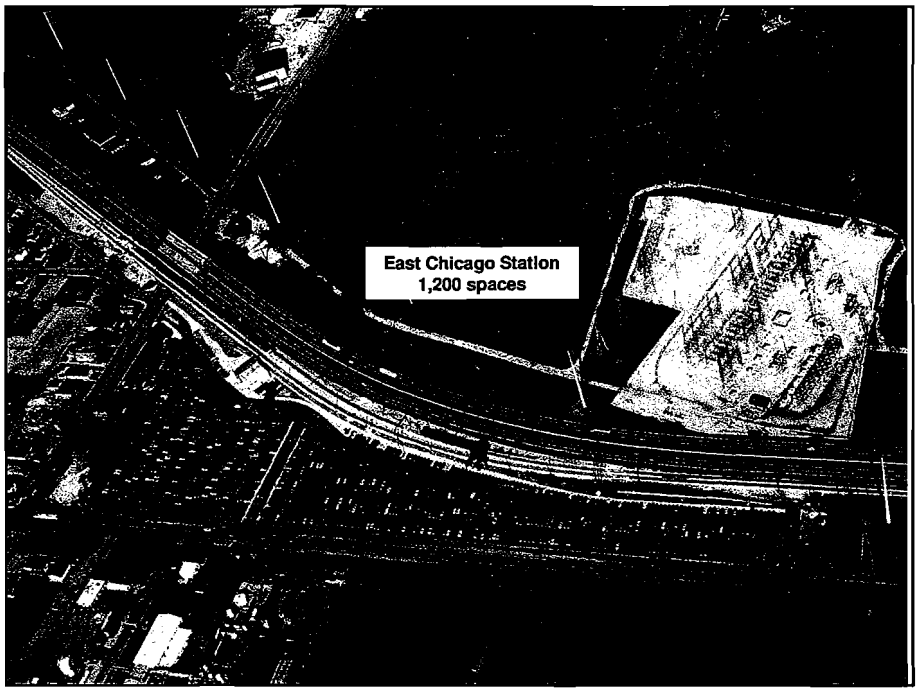
SOUTH SHORE IMPROVEMENTS

- Enhancing safety
  - Reducing grade crossings
  - Implement Positive Train Control
- Improve Reliability
  - Centralized Train Control (complete this year)
  - Catenary renewal program (complete thru Phase 2 – Phase 3 unfunded South Bend to Mich City)
- Improve Capacity
  - Kensington By-Pass
  - **Additional Double-Track**



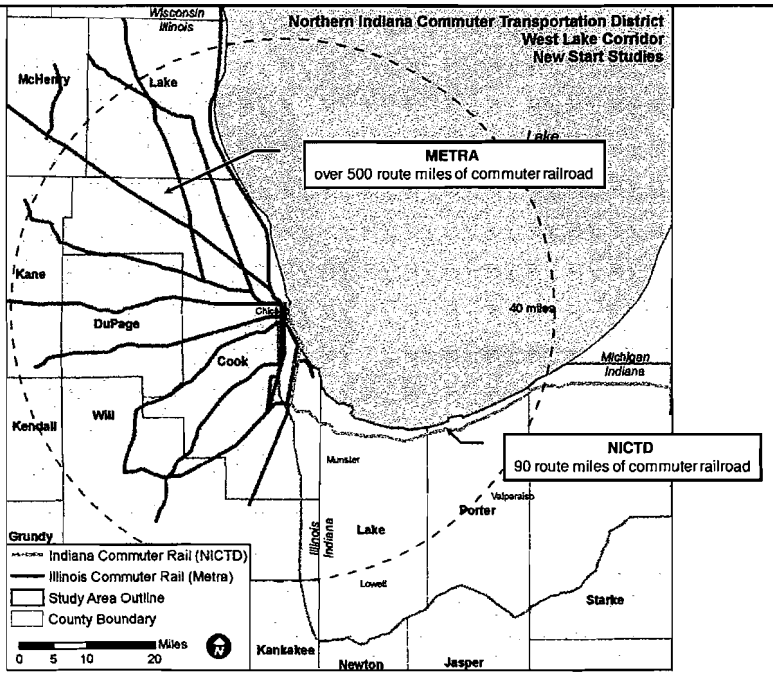
SOUTH SHORE IMPROVEMENTS

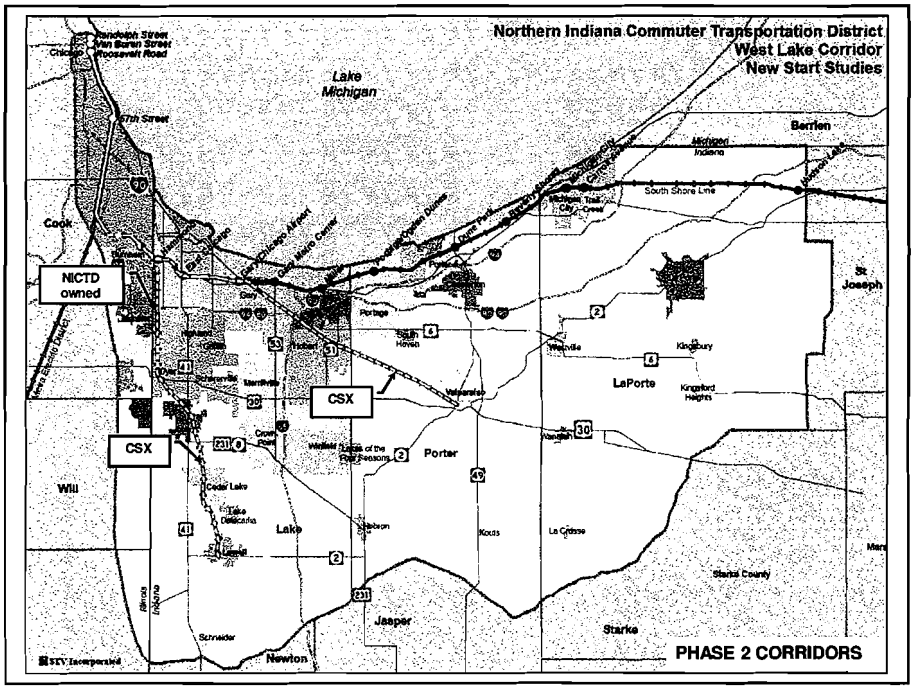
- Enhancing safety
  - Reducing grade crossings
  - Implement Positive Train Control
- Improve Reliability
  - Centralized Train Control (complete this year)
  - Catenary renewal program (complete thru Phase 2 – Phase 3 unfunded South Bend to Mich City)
- Improve Capacity
  - Kensington By-Pass
  - Additional Double-Track
  - **Expanding Parking Lots**



SOUTH SHORE IMPROVEMENTS

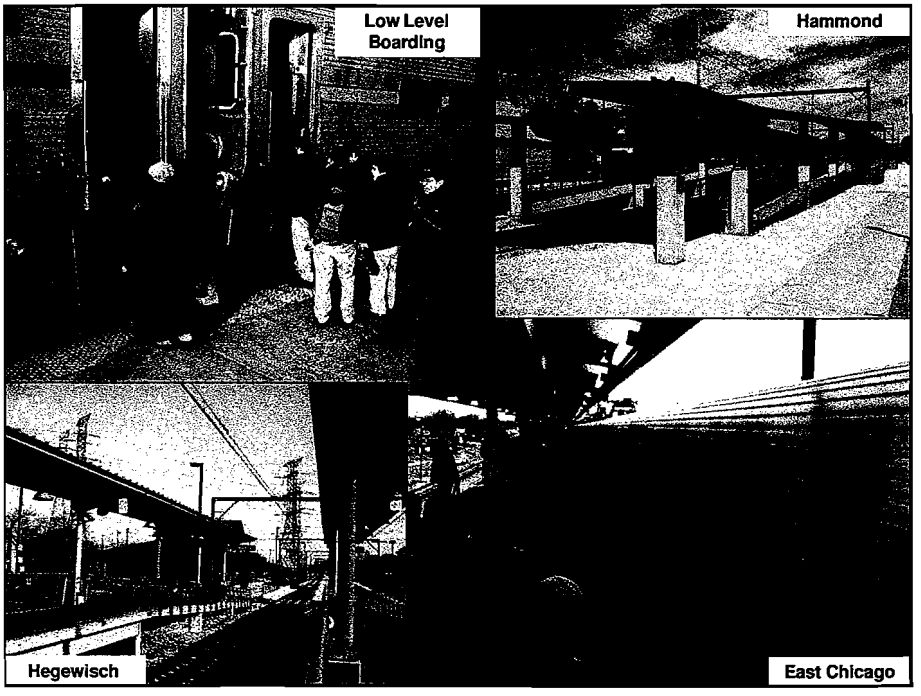
- Enhancing safety
  - Reducing grade crossings
  - Implement Positive Train Control
- Improve Reliability
  - Centralized Train Control (complete this year)
  - Catenary renewal program (complete thru Phase 2 – Phase 3 unfunded South Bend to Mich City)
- Improve Capacity
  - Kensington By-Pass
  - Additional Double-Track
  - Expanding Parking Lots
  - **West Lake Expansion**




Northern Indiana Commuter Transportation District
West Lake Corridor
New Start Studies
Lake Michigan
Randolph Street
Van Buren Street
Roosevelt Road
Chicago
57th Street
Cook
Berrien
Michigan
Indiana
South Shore Line
Michigan City
Chicago Metra
Grand Trunk Western
Chicago Metra Center
Chicago Dunes Dunes
Gary Metro Center
Gary
Portage
South Haven
Valparaiso
Wanatah
Kingsbury
Kingsford Heights
LaPorte
St. Joseph
NICTD owned
CSX
CSX
Hobart
Merrillville
Schererville
Crown Point
Wheatfield
Lake of the Four Seasons
Porter
Cedar Lake
Lake Dalecarlia
Lake
Hebron
Kouts
La Crosse
Will
Illinois
Indiana
Schneider
Newton
Jasper
Starke
Stanislaus County
Marshall County
PHASE 2 CORRIDORS

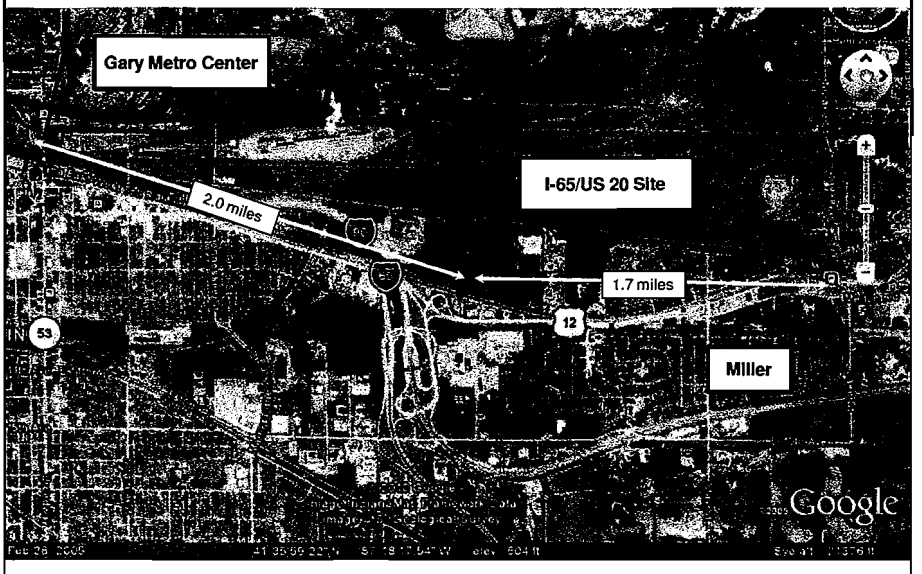
SOUTH SHORE IMPROVEMENTS

- Reduce Travel Time
  - Construct High Level Platforms



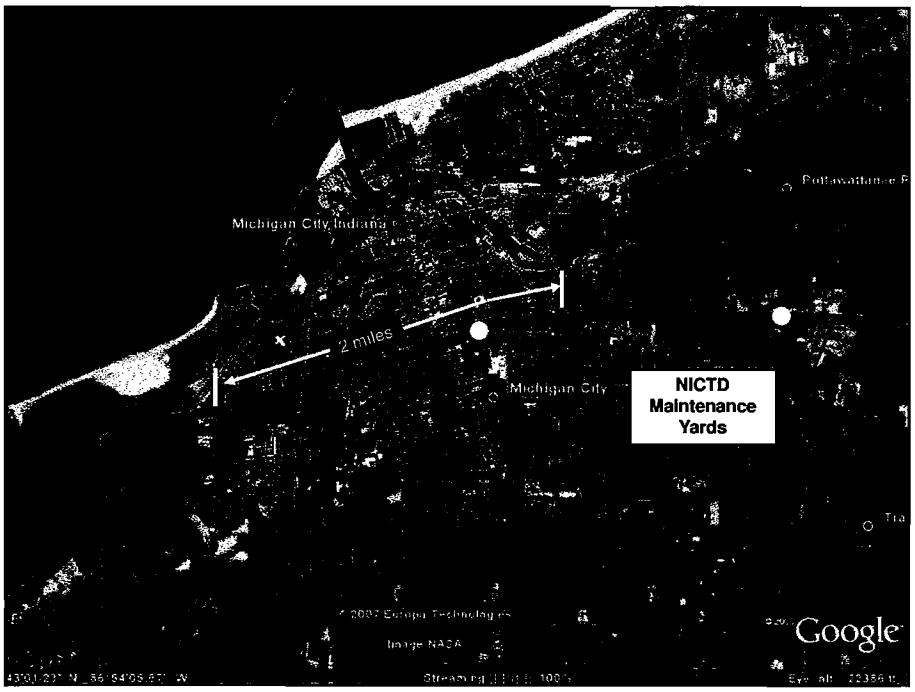
SOUTH SHORE IMPROVEMENTS

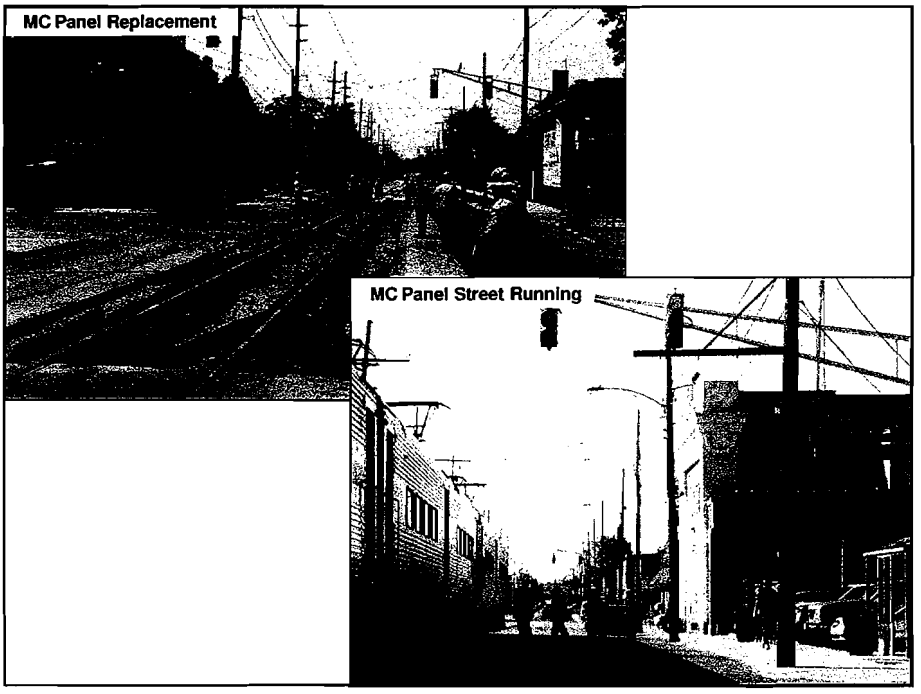
- Reduce Travel Time
  - Construct High Level Platforms
  - **Station Consolidation (Gary and Michigan City)**

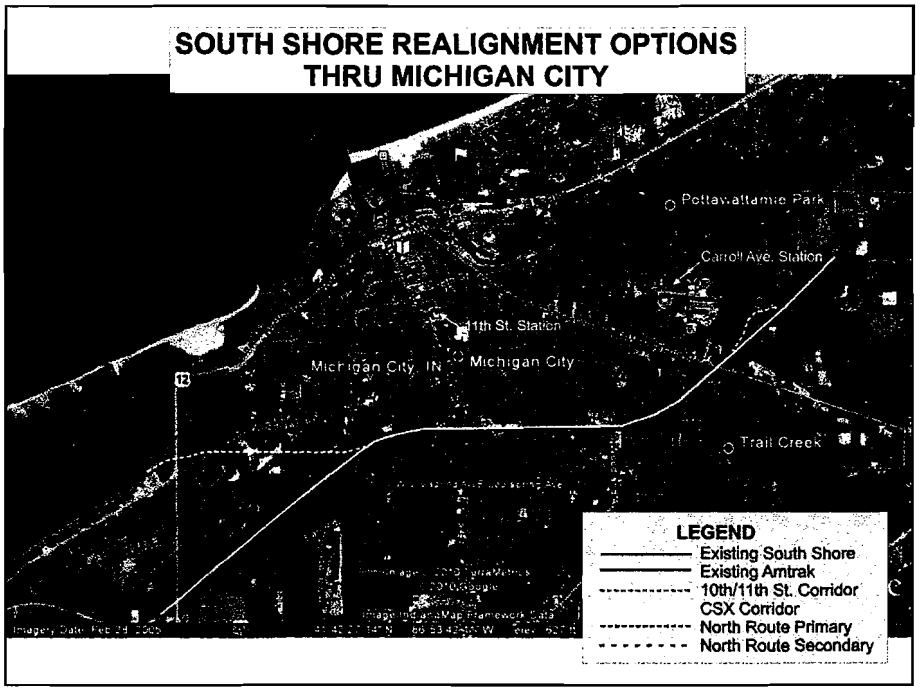


SOUTH SHORE IMPROVEMENTS

- Reduce Travel Time
  - Construct High Level Platforms
  - Station Consolidation (Gary and Michigan City)
  - **Michigan City Realignment**

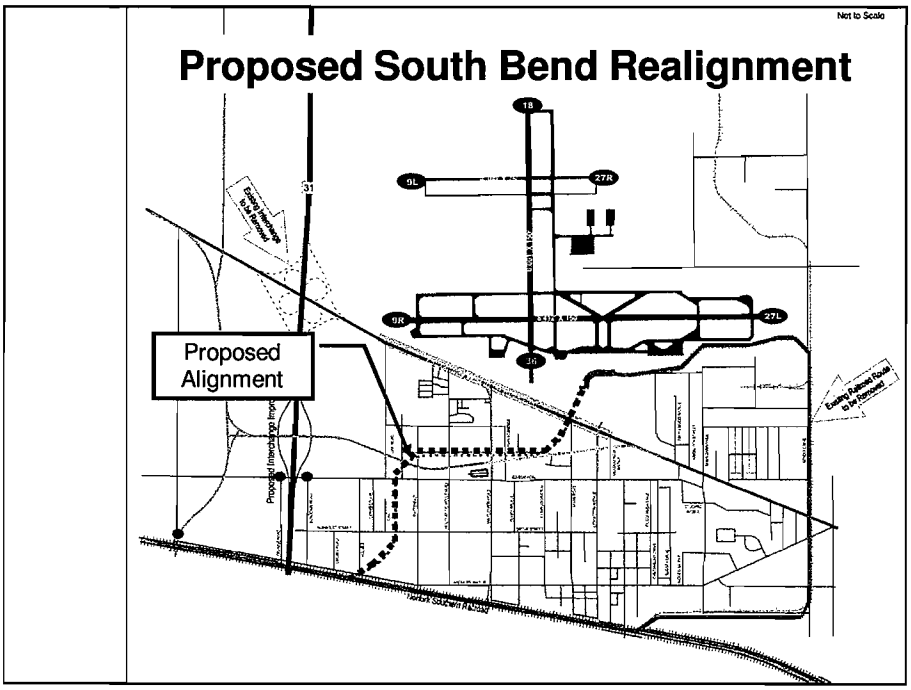



MC Panel Replacement
MC Panel Street Running


SOUTH SHORE REALIGNMENT OPTIONS
THRU MICHIGAN CITY
Pottawattamie Park
Carroll Ave. Station
11th St. Station
Michigan City, IN
Michigan City
Trail Creek
LEGEND
Existing South Shore
Existing Amtrak
10th/11th St. Corridor
CSX Corridor
North Route Primary
North Route Secondary

SOUTH SHORE IMPROVEMENTS

- Reduce Travel Time
  - Construct High Level Platforms
  - Station Consolidation (Gary and Michigan City)
  - Michigan City Realignment
  - **South Bend Realignment**



SOUTH SHORE IMPROVEMENTS

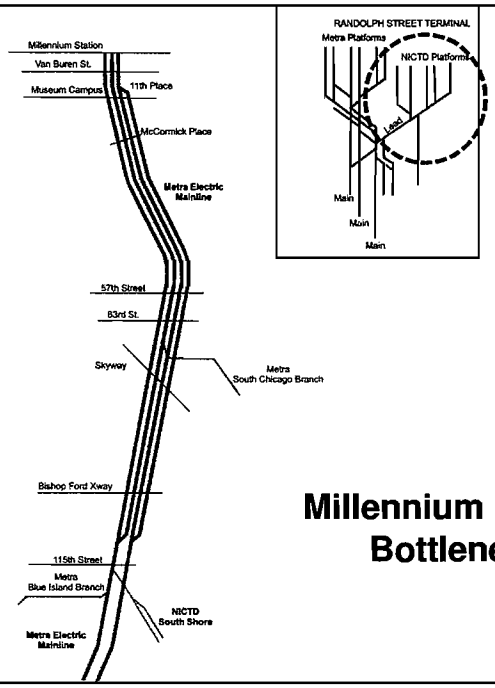
- Reduce Travel Time
  - Construct High Level Platforms
  - Station Consolidation (Gary and Michigan City)
  - Michigan City Realignment
  - South Bend Realignment
- **Provide More Frequent Service**
  - **Requires 30 additional passenger cars**

SOUTH SHORE IMPROVEMENTS

- Reduce Travel Time
  - Construct High Level Platforms
  - Station Consolidation (Gary and Michigan City)
  - Michigan City Realignment
  - South Bend Realignment
- Provide More Frequent Service
  - Requires 30 additional passenger cars
  - **Requires additional car storage capacity in Michigan City and Chicago**

SOUTH SHORE IMPROVEMENTS

- Reduce Travel Time
  - Construct High Level Platforms
  - Station Consolidation (Gary and Michigan City)
  - Michigan City Realignment
  - South Bend Realignment
- Provide More Frequent Service
  - Requires 30 additional passenger cars
  - Requires additional car storage capacity in Michigan City and Chicago
  - **Requires a parallel lead track into Millennium Station**



Millennium Station Bottleneck

INVESTMENT SOUTH SHORE

TIME FRAME	IMPROVEMENT	INVESTMENT
2012-2017	South Bend Catenary	$25,000,000
	South Bend Realignment	15,000,000
	Michigan City Realignment	100,000,000
	Dune Park Hi-Level Platform	5,000,000
	Gary Station Consolidation	37,700,000
	Portage/Ogden Dunes Hi-Level Platform	5,000,000
2018-2031	28 miles of additional double track	115,000,000
	68 Replacement Rail Cars	238,000,000
	Expanded Car Storage Michigan City	25,000,000
	30 Rail Cars (increased schedule frequency)	105,000,000
	Positive Train Control	32,000,000
	New parallel track lead Chicago	20,000,000
2032>	Replace East Chicago Toll Rd. Bridges	285,000,000
	Total	**$1,007,700,000**

INVESTMENT WEST LAKE

TIME FRAME	IMPROVEMENT	INVESTMENT
2018-2031	WEST LAKE EXPANSION	
	From Chicago to Dyer	465,000,000
	From Dyer to Lowell	336,000,000
	From Gary to Valparaiso	341,000,000
	Total	**$1,142,000,000**

Indiana General Assembly

Joint Study Committee On Transportation And Infrastructure Assessment And Solutions

Indiana Motor Truck Association

September 6, 2011

Good morning Mr. Chairman and members of the committee. My name is Gary Langston and I am the President of the Indiana Motor Truck Association, a position I have held for the past 8 months. I assumed the association responsibilities from Kenny Cragen who was at the helm for the past 23 years. As you know, Kenny now spends his time at the Statehouse helping you stay informed regarding issues important to the trucking industry. He and I work closely together in that effort. I appreciate the opportunity to speak before this committee.

Prior to January of this year, I spent close to four decades with UPS. My family and I have recently returned to Indiana which is our home state, and also one which has long been known as a model example of a truck friendly environment. That positive environment is the product of Government and Industry working together for the good of us all.

A prime example was the creation of the "One Stop Shop", a Department of Revenue function which has attracted trucking companies from across the nation. The efforts of Jim Poe and his staff have resulted in the registration of nearly a quarter million trucks here in Indiana. By a wide margin, that's more than in any other state. Those registrations generate nearly $90 million in annual revenue. The One Stop Shop is a great asset to the trucking industry throughout Indiana.

Transportation infrastructure is crucial to commerce and our highways are central to that focus. Everything each of us has as consumers traveled in a truck on a highway at some point during the supply chain. Whether it's your toothbrush, your medical supplies or your automobile-a truck brought it.

TIAS 9/6/2011

Ex. I

We have a clear understanding of the importance of a strong infrastructure. The IMTA believes there is a role for public-private partnerships in meeting our infrastructure needs. As you know Mr. Chairman, we supported the lease of the Indiana Toll Road and the Major Moves Project, and last session supported the legislative changes to enhance the possible future construction of the Illiana Expressway.

The need for continued focus on the upgrade and expansion of existing as well as the development of new infrastructure is unquestionable. The challenge remains in determining where we get the money and how it gets divided among the various important transportation modes. As Mr. Holt from Conexus so accurately described during the August 23rd hearing, Indiana is uniquely positioned to develop a world class logistics infrastructure from our rail, port, air and trucking base. We as truckers support these development efforts. As described earlier, no matter what mode gets it here, it's going to be a truck that gets it to the final destination. As Mr. Falkenberg of Appian Advisors shared during the first hearing, truck freight will at least double during the next 20 years. We have to be ready for that. Our industry has to be certain we have the highways to travel efficiently and safely at a cost we can afford.

As an association, we have acknowledged our understanding that, when called for, an increase in toll usage might be appropriate. With that in mind, it is also important to clarify that we are opposed to tolls on existing highways, are opposed to tolling when presented as a mandate and do not support the replacement of the fuel tax with tolls. The fuel tax is more broad based, equitable and can be collected much more efficiently.

With regard to fuel tax, Indiana has the largest disparity between the tax on automobile gasoline and the tax on truck diesel. Trucks pay 27 cents tax per gallon and cars pay 18 cents tax per gallon of gasoline. Most states charge the same for both. We ask that you look at this disparity.

Indiana already has a higher than average diesel fuel tax. Only 19 states of the 50 states have a higher tax on diesel fuel than Indiana.

All but three states collect their total tax on truck diesel fuel through the price paid at the pump. Virginia(3.5 cents), Kentucky(10.2 cents) and Indiana(11 cents) collect a portion of their revenue through a surtax which is paid quarterly through a check written by each carrier to the state based on the fuel used/miles driven reports calculated and submitted by each individual carrier.

Moving any portion of the 11 cents surtax to the pump price is an automatic revenue increase for the state in that it provides immediate, complete and accurate tax collection from all users. Each penny moved to the pump represents additional revenue of $2.4 million per year. The 11 cents surtax represents a revenue loss of $26 million per year.

Finding the best solutions to address these important issues will continue to require much energy, focus, analysis and collaboration. We in the trucking industry are anxious to partner in that effort.

Again, I appreciate your time and look forward to working with this committee in the future.