Transportation In Maine

MaineDOT

Acknowledgements

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Thank you!

Sincerely,

Rick J. Dubois, Director
Systems Management Division,
Bureau of Planning
MaineDOT

Introduction

This is the Executive Summary of Maine's 2006 State of the System Report. Its purpose is to catalog transportation assets and their condition, report on the uses, identify the present and future needs, and develop and recommend funding strategies for Maine's transportation system. This report is a precursor to MaineDOT's Long-Range Transportation Plan and it provides data-supported historical trends and future predictions essential for long term planning. In short, the State of the System Report is a tool for strategic transportation planning and analysis of the state system and the physical infrastructure that supports the movement of Maine's people and goods.

The Long-Range Transportation Plan

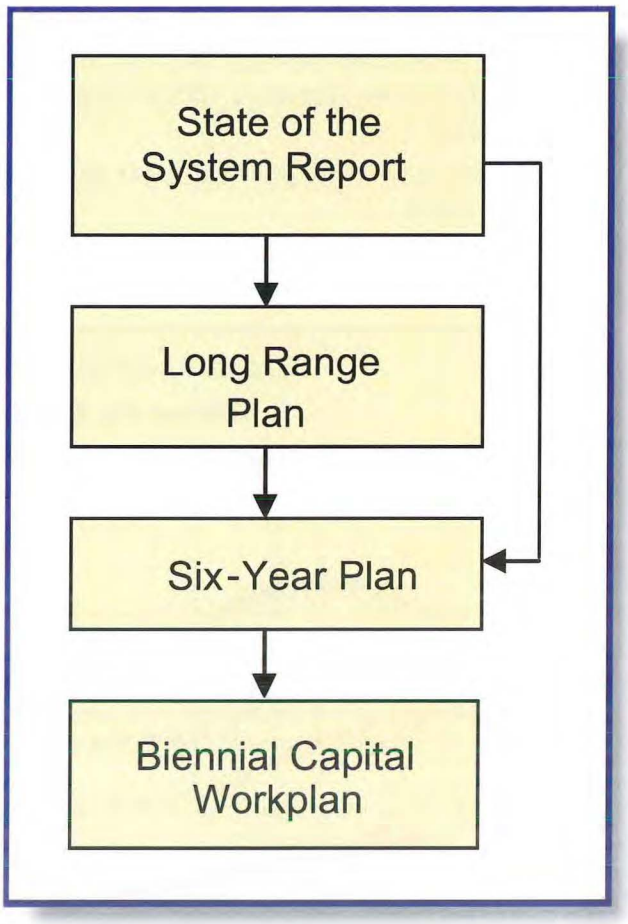
expresses MaineDOT's mission, policies and the long-term goals, objectives, and strategies that guide the Department's allocation of resources. MaineDOT formulates the Long-Range Plan on the basis of the condition and performance of the system and on information obtained from the public, municipal officials, Regional Planning Commissions (RPCs) and the Legislature.

The Six-Year Transportation Improvement Plan

links the goal-oriented Long-Range Plan with the project-based Biennial Capital Work Plan, formerly BTIP. The Six-Year Plan includes specific project candidates that MaineDOT anticipates funding over the next six years or next three Capital Work Plans. The Six-Year Plan provides the opportunity for MaineDOT to begin developing projects with municipalities and developing detailed scopes of work and cost estimates.

The Biennial Capital Work Plan

updated every two years, lists the projects that MaineDOT intends to fund over the upcoming two-year period based on an assessment of federal and state resources and project cost estimates. Work Plans provide project-specific details and are based on the goals and priorities of both the Long-Range Plan and Six-Year Plan.



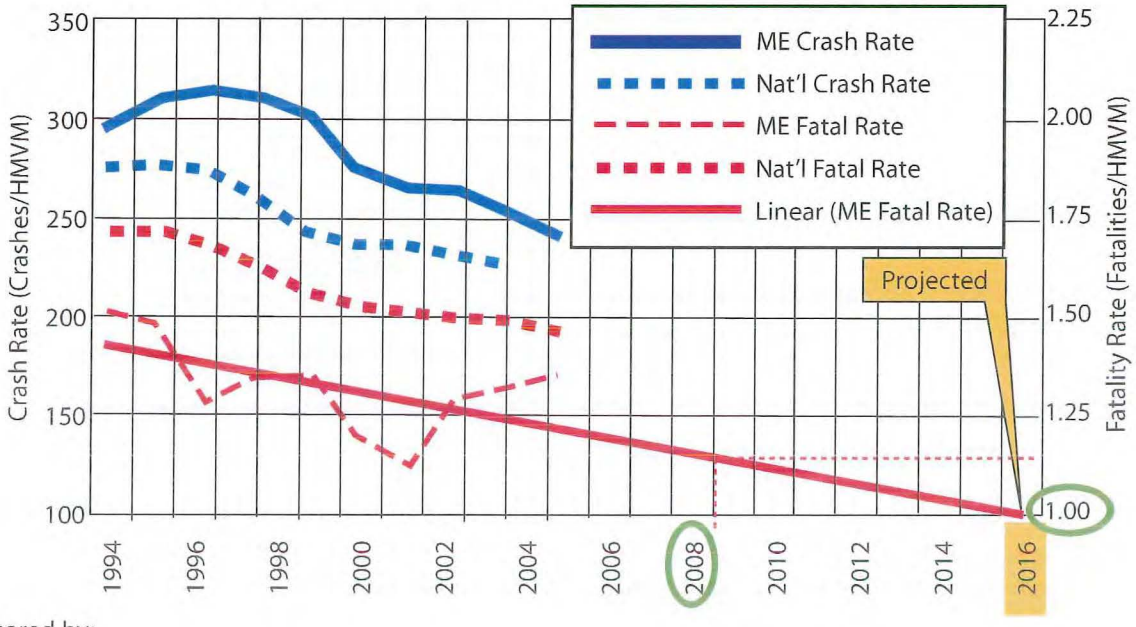
2.0 Executive Summary

Safety

Performance: Motor vehicle crashes in Maine result in significant economic and societal impacts.

- Maine's 2004 crash rate, was 237 crashes per hundred million vehicle miles traveled (HMVM) which is higher than the national rate of 220. The crash rate has dropped about 20% over the past 10 years.
- Fatalities on Maine public roads reached a recent high of 216 in 2002, declining to 194 in 2004 and further declining to 168 in 2005, a 20-year low. The 2004 fatality rate of 1.31 per HMVM is lower than the national average of 1.46. Maine's fatality rate has dropped 13% over the past ten years.
- Twenty percent of crash fatalities occur on local roads.
- The state's leading fatal crash type is Lane Departure (Head On and Run off Road) crashes - 36% of total crashes and 76% of total fatalities.
- Driver behavior is often the core crash causation. The primary contributing factors (driver elements) for Maine crashes are Driver Inattention, Illegal or Unsafe Speed, Failure to Yield Right of Way and Following Too Close. Illegal/

Crash and Fatality Rate Comparisons
Maine vs. National (1994-2003)
and Projection for Achieving 1.0 Fatalities/HMVM



Prepared by:
Safety Office
Maine Department of Transportation

HMVM: Hundred Million Vehicle Miles
Fatalities: Those occuring in public road crashes

Unsafe Speed is related to nearly 40% of Maine's traffic fatalities.

- MaineDOT's Hazard Elimination Program has been successful with Benefit-to-Cost ratios for projects completed between 1997 and 2000 of 8.18. The overall crash reduction resulting from completed projects in this time period is 32.2%. The overall reduction in the economic impact of those crashes is 63.5%.
- Aggressive driving as a proportion of total crashes (especially speed- related) continues to grow – now at 33.7%.

Need: There is a national goal to reduce the fatality rate to 1.0 by 2008, and current trends show Maine will fall well short of this target.

- In 2004 a coordinated multi-agency Strategic Highway Safety Plan was initiated with focus on four core safety concerns: **Seat Belt Usage; Lane Departure Crashes; Aggressive Driving; and Older/Younger Drivers.**
- As part of the Maine Transportation Safety Coalition (MTSC), MaineDOT helped produce a comprehensive state crash report titled **The Status of Transportation Safety in Maine.**
- MaineDOT participates in a media campaign to increase public safety awareness through a partnership with TV stations in major markets.

To achieve system safety improvements and bring about the targeted goals to preserve life and reduce economic loss on our highways, future significant needs are indicated in the Hazard Elimination and SAFETEA-LU (Other) fund levels. Most of the past on-road improvement safety funds have been focused on intersection improvement. With Maine's significant Lane Departure problem, more concentration will be directed to stretches of highway where crash problems have been frequent and severe – without disregarding intersection safety needs. With 20% of fatalities occurring on local roads, funding support will be needed for municipalities. Also, attention needs to be directed at High Risk Rural Roads to implement effective low cost solutions. As important and central as system improvements are to MaineDOT, the bottom line causation of crashes almost always involves driver decision-making or behavior, so public outreach is an important safety component. MaineDOT will devote some of its resources to the human factor of crash incidence, and will often work in partnership with other stakeholders in the endeavor to change Maine's driver culture and risk taking tendencies.

Most, if not all of the capital improvements implemented by MaineDOT have a safety component. The average biennial safety investment level on projects whose primary purpose is safety has been $9.8 million. The strategic investment level in 08/09 for these safety improvements is $16.9 million.

2.0 Executive Summary

Highway Network

- 22,750 miles of public road
- 8,368 miles state owned
- 13,930 miles town ways
- 452 miles other (Maine Turnpike, reservation, parks, etc)
- 1,737 miles of unbuilt roadway
- 1,854 miles of seasonally posted roads
- Maine DOT is responsible for 37% of the public road network, and 78% of all travel in Maine occurs on these roads.
- 27,459 cross culverts
- 28,400 entrance culverts
- 1,590 struts (culverts > 5' & < 10')
- 4.32 million feet of guardrail

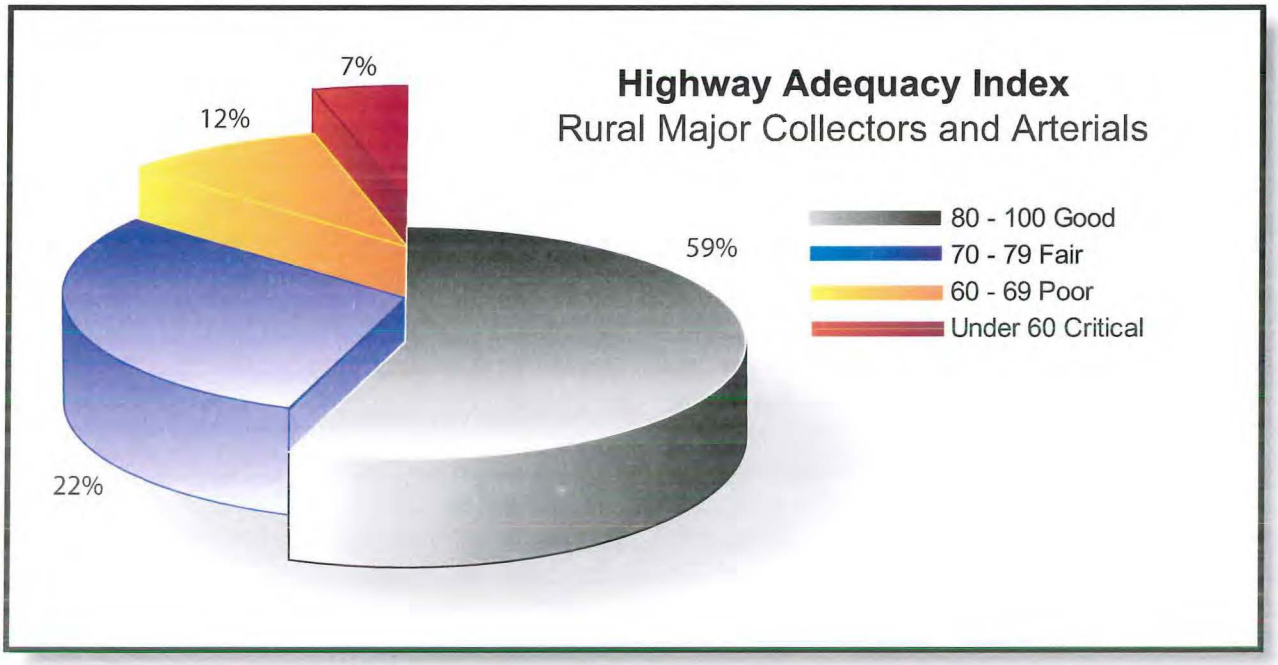
Highway Adequacy

The Highway Adequacy Index (HAI) is an empirical evaluation of the health of a particular highway segment relative to the entire highway network. The HAI is based on 3 basic criteria: condition, safety, and service. The HAI is a cumulative index derived using the following table, which shows the respective point weighting for each Sub Index.

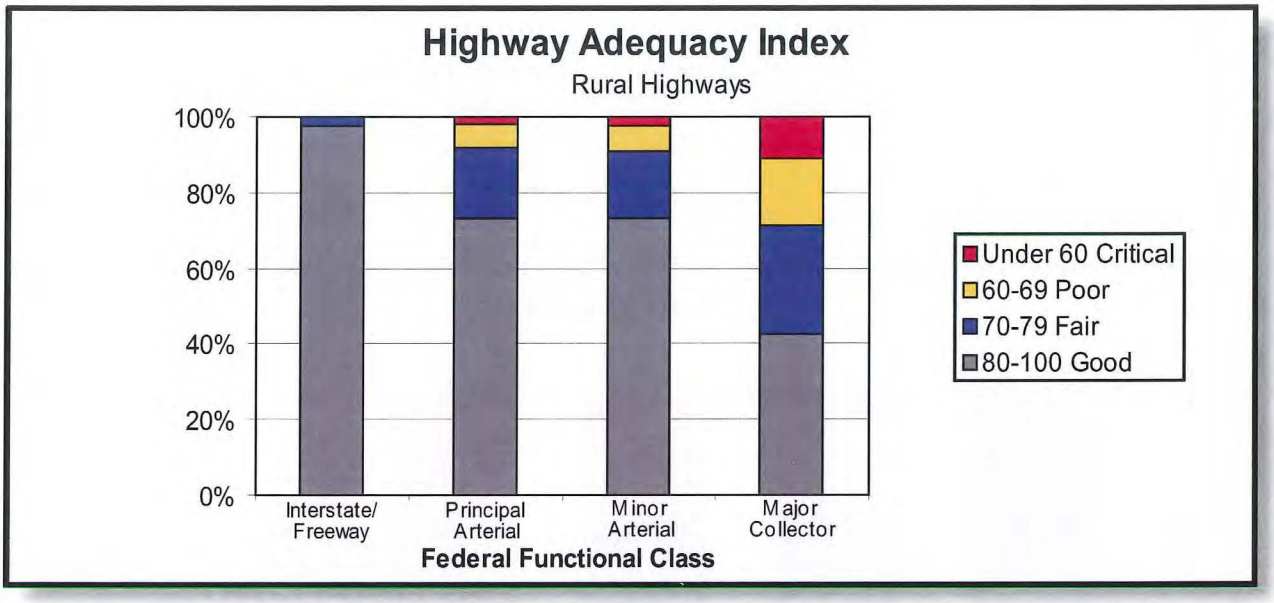
The HAI on rural roadways depicted below indicates that 59% of the roadway mileage is considered "good" with an index of at least 80, while 7% of the highway mileage is considered to be "critical".

Highway Adequacy Index

Sub Index	Arterials & Major Collectors Point Weighting:
Condition Index	50
Safety Index	25
Service Index	25
Total	**100**



2.0 Executive Summary



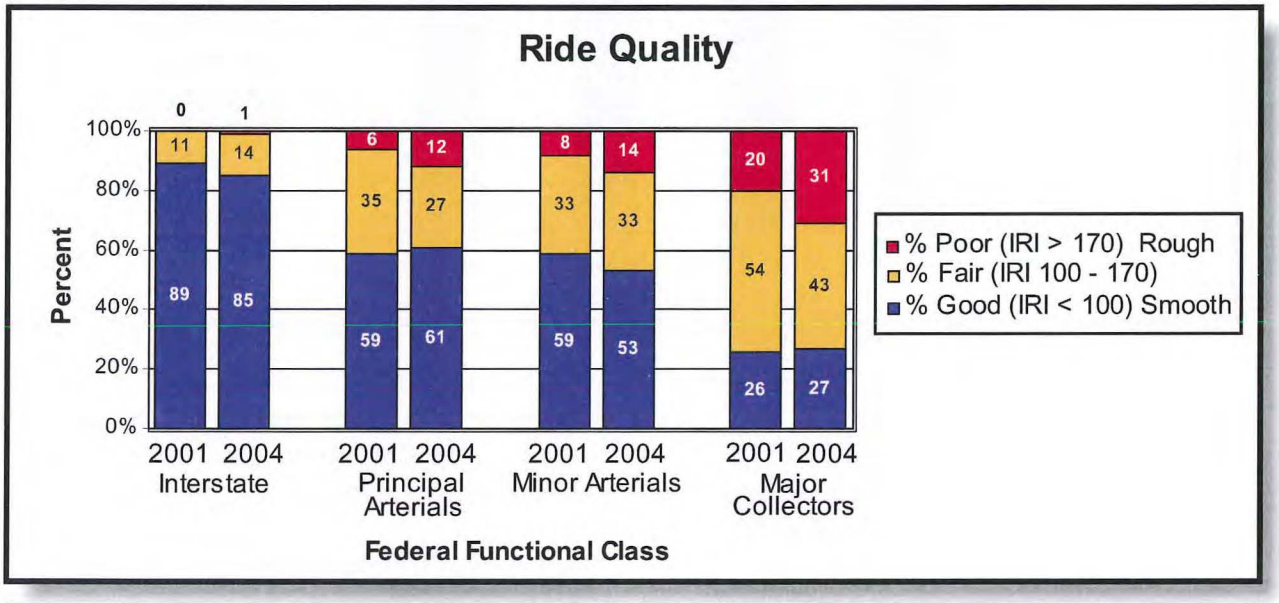
- The Interstate System has over 97% of its rural mileage rated "good".
- The Interstate system comprises slightly over 9% of all rural highway mileage.
- The Major Collector System has 71% of its rural mileage rated "fair" or "good", while this system accounts for nearly 58% of the rural mileage.
- Nearly 90% of all Critical mileage is on the Major Collector System.

The HAI is a way for the Department to prioritize highways to be addressed through capital improvements and to better quantify the system need for these improvements. Currently the quantification for system need is done using unbuilt roads data and or spring time postings. While these are valuable ways to identify roadways that require significant treatments to address their deficiencies they do little in discerning a difference between unbuilt sections of roadway. HAI takes into account both safety and the service being provided to the traveling public and in turn derives a priority rating based on the three sub indices.

HAI is currently in its infancy. Over the next biennium the Department intends to greatly expand the reliability and accuracy of the HAI. Many initiatives are currently underway to improve the HAI; the two that will have the largest impact are inclusion of Curve and Grade Data into the Safety Index and the inclusion of network level Falling Weight Deflectometer readings into the Condition Index. With these two major improvements it is expected that the HAI rating of each road can greatly enhance the methods for which the Department identifies, quantifies the needs, and prioritizes the improvements of the highways under its jurisdiction.

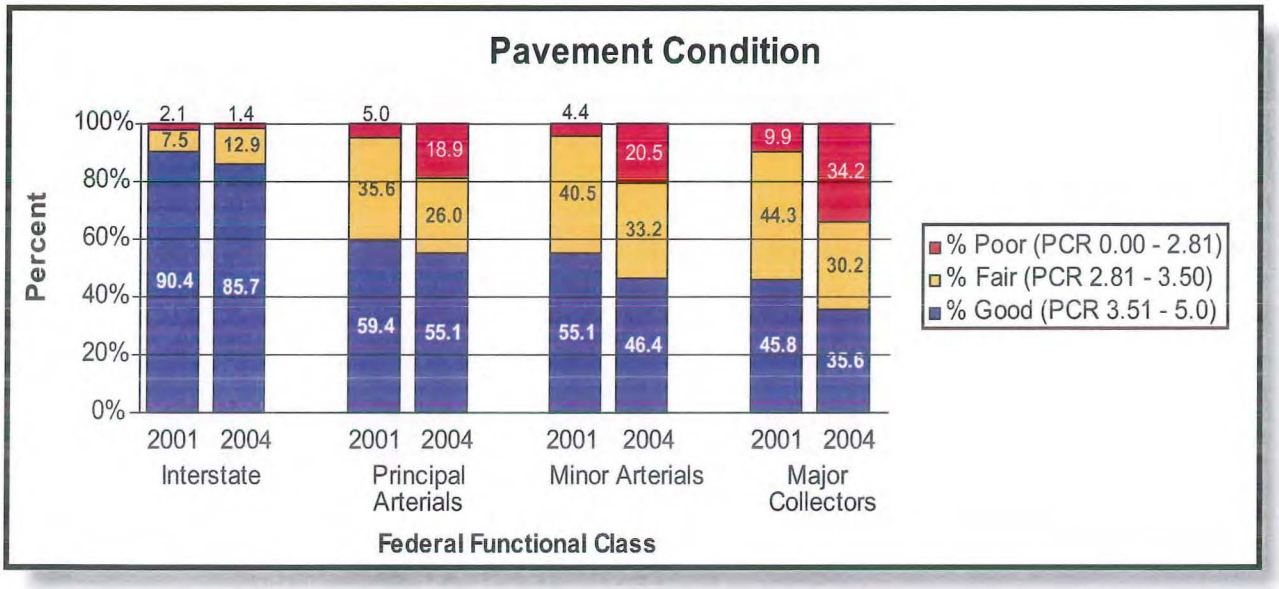
Ride Quality

Ride quality has been found to be a key indicator of customer satisfaction, and is expressed in terms of International Roughness Index (IRI). IRI is measured in inches of vertical displacement per mile, thus the lower the IRI, the smoother the ride will be. The following chart shows that ride quality has declined between 2001 and 2004 on nearly all classes of state maintained highway.

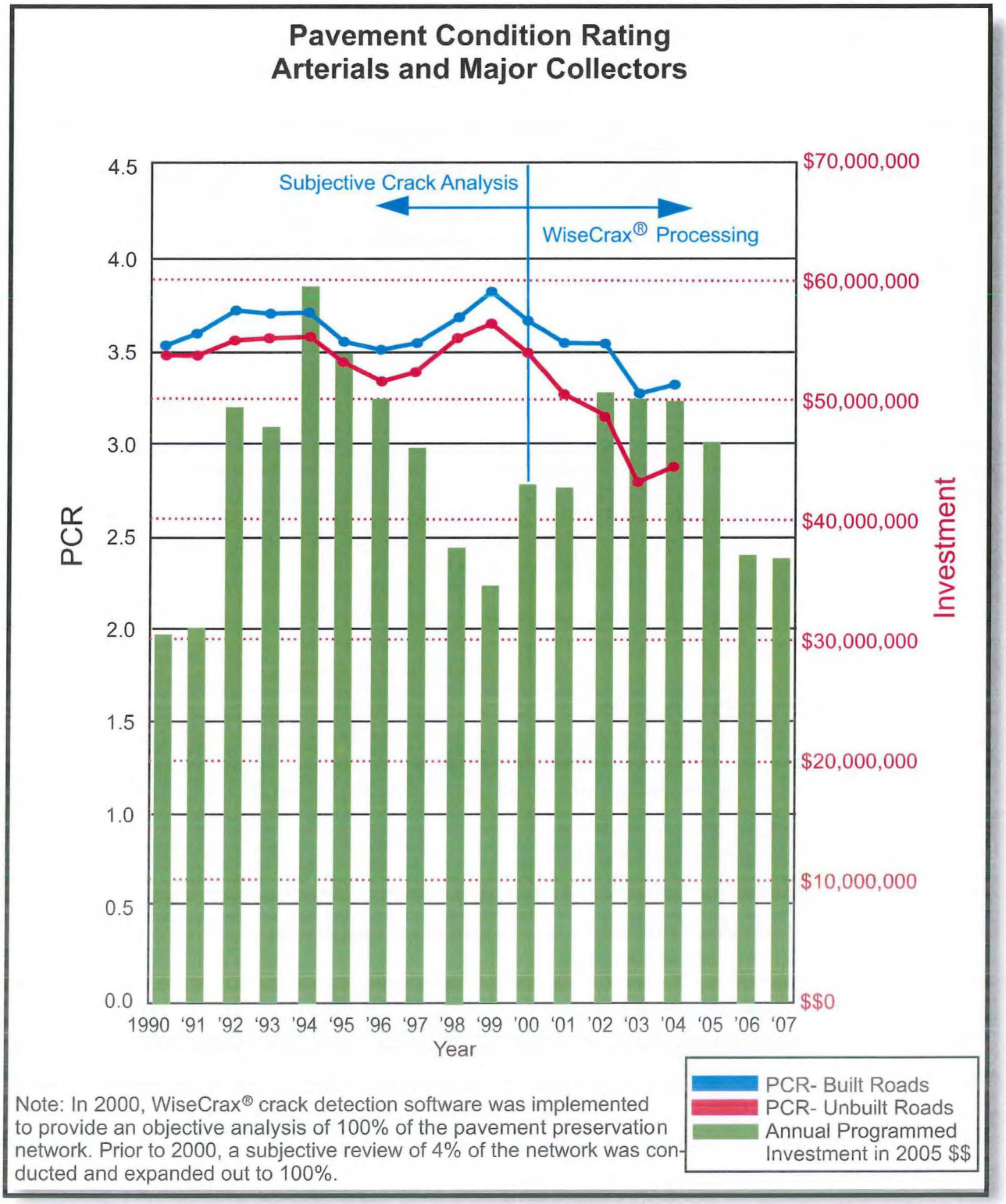


Pavement Condition

Pavement Condition Rating (PCR) is defined as the composite condition of the pavement of a roadway. The PCR is compiled from the severity and extent of pavement distresses such as cracking, rutting, and patching, and the ride quality (IRI). The rating system uses a scale of 5.00 (perfect) to 0.00 (fully-deteriorated). The following chart shows that pavement condition has declined between 2001 and 2004 on nearly all classes of state maintained highway.



As can be seen in the following graphic, the average pavement conditions network-wide remained relatively constant throughout the 1990's. There was a slight upward trend in PCRs from 1996 through 1999, but over the last 6 years, the average PCR values have decreased. Low and high network pavement condition ratings are seen approximately 4 to 5 years after lower and higher levels of funding respectively.



Highway Investments

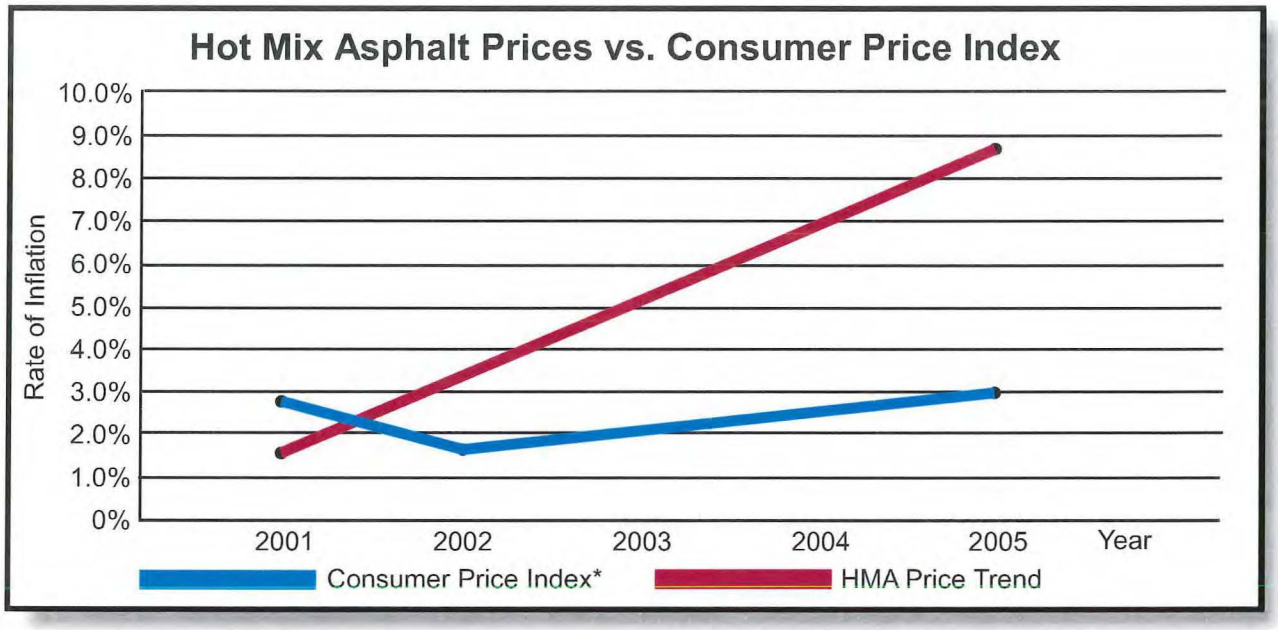
The Department's highway investments can be broken up into three distinct categories:

- Highway Improvements are generally those projects done on an unbuilt (backlog) roadway to improve the condition of the road and to meet current safety and geometric standards.
- Pavement Preservation Projects are those performed on a built highway to preserve the initial investment in building the highway and to maintain a suitable surface condition.
- Maintenance Paving is defined as paving that is done on unbuilt highways in order to keep those roads in a serviceable condition until such time as a more substantial treatment can be performed.

Federal Functional Class	Rural Unbuilt Miles	$ per Mile (to improve)	$ to Improve All Rural Miles
Principal Arterials	78	$2,900,000	$226,200,000
Minor Arterials	117	$1,600,000	$187,200,000
Major Collectors	1542	$700,000	$1,079,400,000
Total:	**1737**	**$859,400**	**$1,492,800,000**

Investment Type	Treatment Type	Price Per centerline mile	Expected Life
BUILT ROADS			
Pavement Preservation	Crack Sealing	$3,000 - $7,000	2 Years
	Overlay	$110,000 (PPM) $260,000 (Level 2)	8 - 10 Years
	Reclaim/Overlay	$425,000	12 - 15 Years
	State PPM	$50,000	6 - 8 Years
UNBUILT ROADS			
Maintenance Paving	Maintenance Surface Treatment (Sand Mix)	$26,500	4 - 6 Years
Highway Improvement	Collector Highway Improvement Project	$500,000 - $900,000	12 - 15 Years
	Highway Improvement	$1,600,000 - $3,200,000	20 Years

It is important to note, however, that the cost of construction materials has significantly outpaced the standard rate of inflation due in large part to increased asphalt and fuel costs. The following graph shows the upward trend of the average price per ton of hot mix asphalt (HMA) over the past 6 years compared to the Consumer Price Index (CPI).



Given the trends above alone, status quo funding for pavement preservation treatments will result in an overall deterioration in the condition of maine's highways.

Highway Improvement Needs

The needs for rural highway improvements within the state are quantified in the table on the preceeding page. The Department has a long history of investing to improve the State's highway system. However, the Department's guiding resource allocation policy states that MaineDOT maintain our existing system prior to investing in improvements or expansion. Over the previous three biennia, the Department has invested an average of $152 million dollars in Highway Improvements. This investment has resulted in the improvement of over 500 miles of highway.

To achieve status quo performance from the highway system requires no additional investment for highway improvements. The traveling public would continue to operate on the existing 1,737 miles of unbuilt, or inadequate roadways with their related spring time weight postings. Given the economic impact of these postings and condition of the inadequate sections of roadway, this is not the strategic goal of the Department.

Highway Investments:

The Department must invest $198 million per biennium for Highway Improvements, a 30% increase over status quo, in order to meet strategic goals.

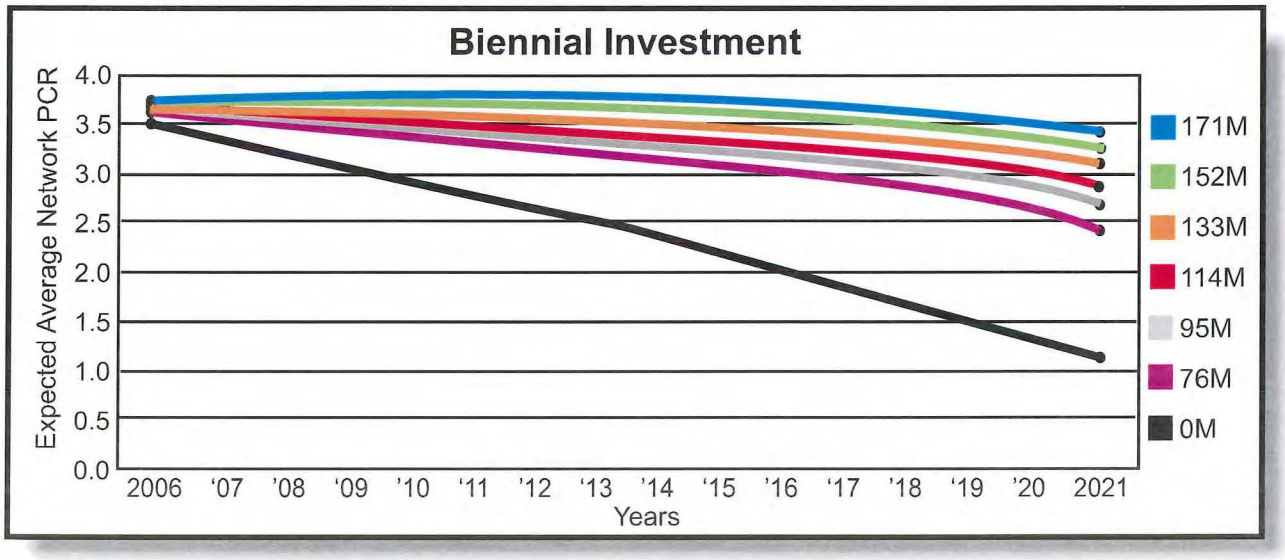
The funding scenarios table at the end of this executive summary estimates the strategic need of improving 259 miles of inadequate rural arterials within a 10 year timeframe. The total estimated cost of this initiative is over $410 million. Over five biennia, this results in an average biennial investment of $82 million. In the same 10 year time frame, the strategic need of negating all spring time weight restrictions on major collectors, a total of 736 miles, is also estimated at a total cost of $515 million or a biennial investment of $103 million. These strategic initiatives along with traditional investments in the minor collector system would require a $198 million biennial investment in highway improvements representing a 30% increase in funding.

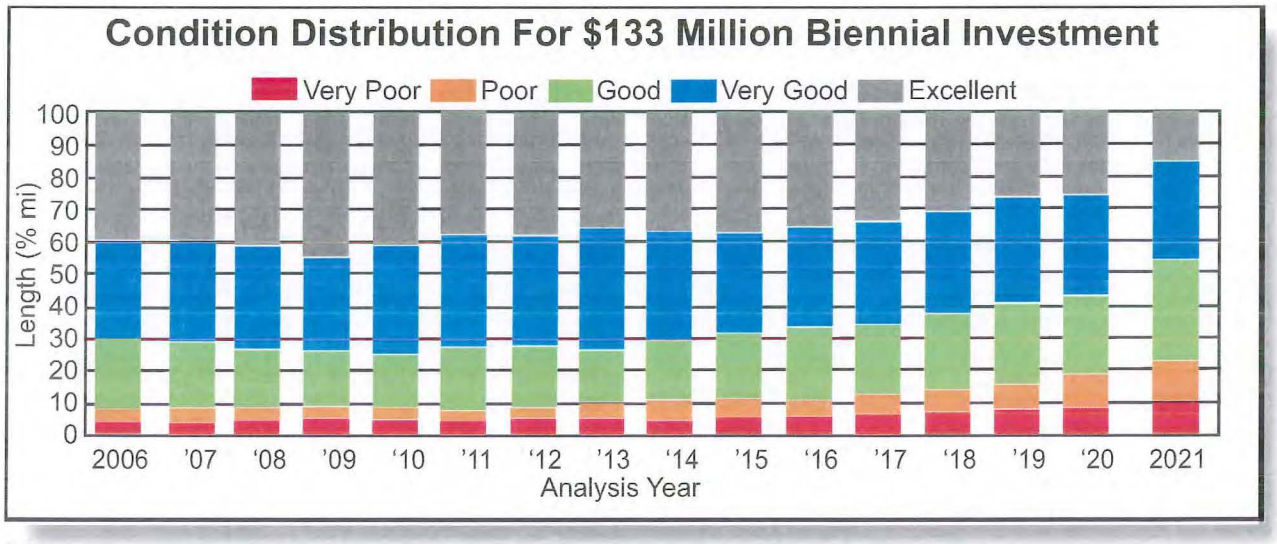
Pavement Needs

The Department's Pavement Preservation philosophy strives to apply the "right treatment at the right time" to maintain the investment and sustain the condition of the highway structure, instead of treating the "worst roads first". This has proven to be the most cost-effective means to preserve the network. The above graph shows the expected average network condition of Maine's built highway system based on various biennial funding levels of the Pavement Preservation Program.

A $133 million capital investment per biennium will be necessary to maintain our built highway network in its current condition for the next 10 years.As can be seen in the second chart on this page, this level of investment keeps the built highway network in a relatively good condition for more than a decade. Alternatively this level of benefit can be achieved by allocating $111 million in capital expenditure to the pavement preservation program combined with a $10 million increase in

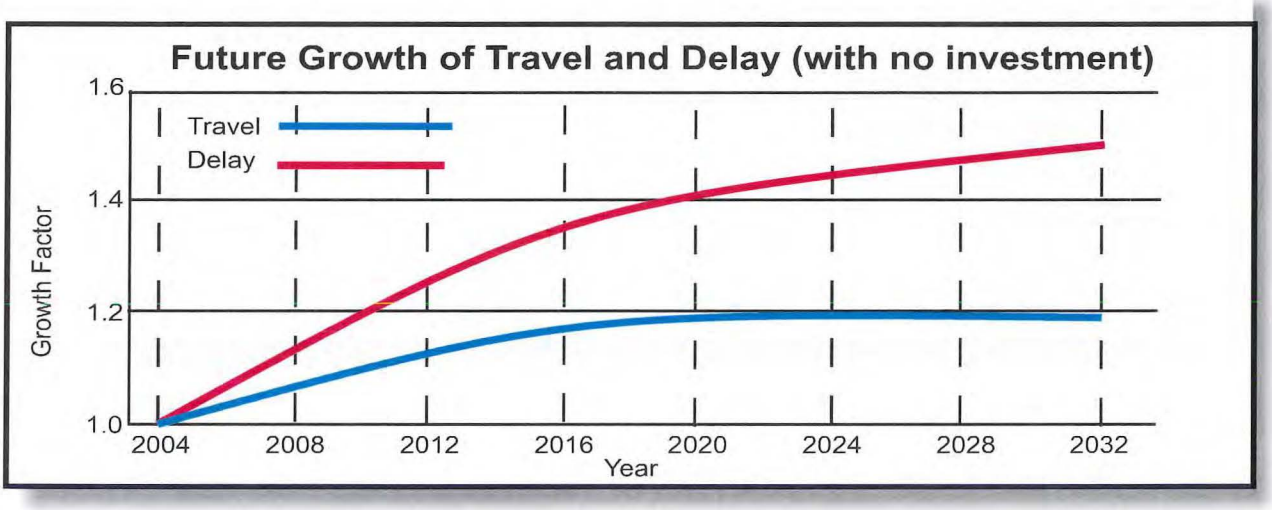
the maintenance paving program to place State PPM on 200 miles of built major collector per biennium. This is the recommended strategic investment level for the Pavement Preservation Program.





Mobility

Mobility is the ability of people and goods to move from one place to another. The arterial highway system provides most of the mobility in Maine. While only representing 12% of the road mileage, arterials account for more than 60% of the vehicle-miles traveled (VMT) statewide. For this reason, the performance of the arterials, in serving the mobility needs of the state, is an important part of the system evaluation.



In 2004, there was nearly 15 billion vehicle miles traveled statewide. Projected growth in travel over the coming years will push statewide VMT toward 18 billion in 2030, although the rate of growth may slow down. As traffic volumes increase, the utilization of available arterial capacity will also increase. If no investments are made to improve the mobility of the existing arterial network, traffic congestion (delay)will increase more rapidly than VMT. The preceding chart shows the relative growth of VMT and congestion (delay) from 2004 to 2030.

However, MaineDOT has a history of making investments to enhance highway mobility. Over the last six years, the level of funding for mobility-enhancing highway projects has averaged $40 million per biennium. If this were to continue for the next 20 years, the investment in highway mobility projects would total $400 million. This is the "status quo" level of investment for mobility purposes.

A variety of strategies are available to enhance mobility on Maine's arterial highways. Major mobility-enhancing strategies include the following:

- **Access Management** - to preserve and enhance the mobility and safety qualities of existing highways.
- **Widening for Auxiliary Lanes** - for left turns, climbing and passing.
- **Widening for Thru Lanes** - for additional capacity on existing highways.
- **New Thru Lanes at a New Location** - for additional capacity around existing highways.

Optimum investments of funds will result in a mix of these investment strategies best suited to improving mobility in the arterial network. The following table shows the potential mixes of these strategies for three funding scenarios, and compares them with the historic mix of strategies. Traditional investment in additional thru lanes where needed continues to be a major part of the investment mix, but a significant share of the investment should be directed toward access management.

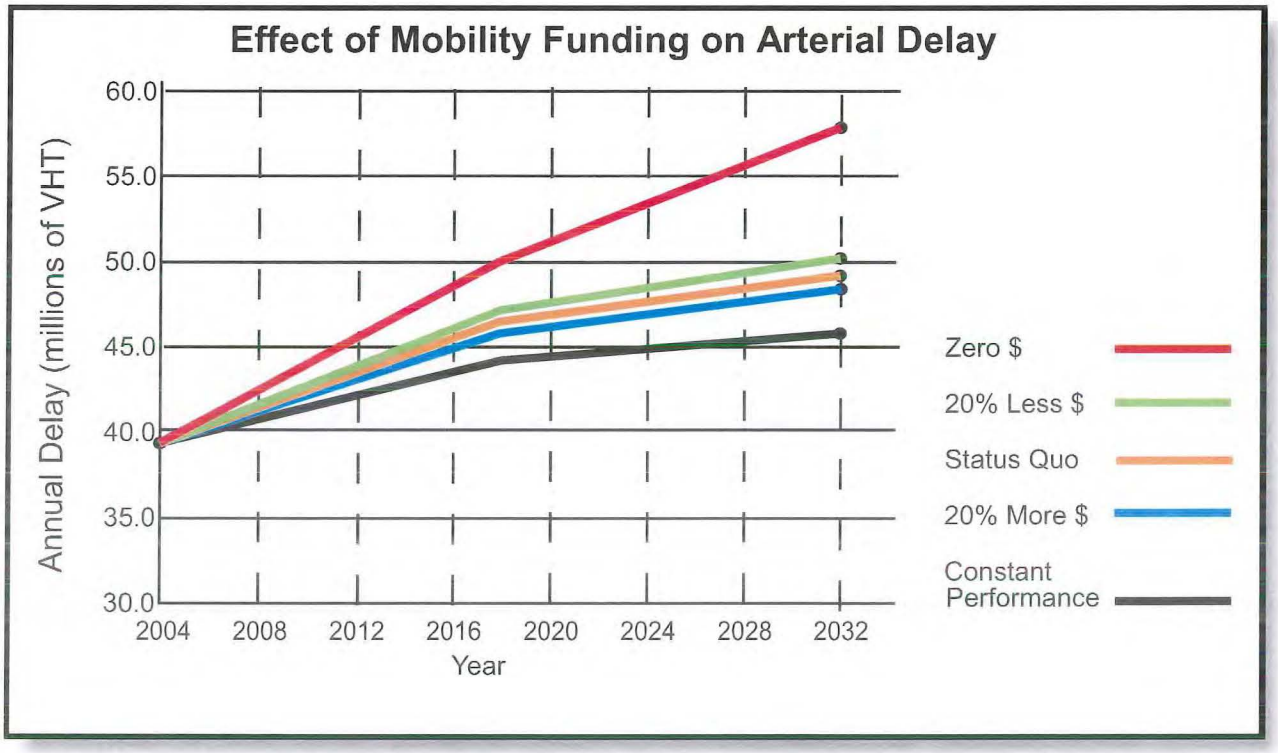
When funding is relatively low, investments in the existing arterials should be the core of the mobility investment program. When greater funding is available, more can be invested in new facilities.

Mix of Mobility Strategies for Three Funding Scenarios

Mix of Mobility Strategies for Three Funding Scenarios				
Funding Scenario	**Historic**	**20% Less**	**Status Quo**	**20% More**
Annual Investment ($ millions)	20	16	20	24
Mobility Improvement Strategy	**Investment Share**			
Access Management	0%	19%	19%	18%
Installing Auxiliary Lanes	20%	15%	13%	12%
Widening for Thru Lanes	39%	38%	37%	38%
New Thru Lanes at New Location	41%	28%	31%	32%

Investments in mobility-enhancing actions can manage the growth of congestion on the arterial system. The following chart shows that higher funding scenarios can do more to minimize delay (measured in vehicle-hours traveled or VHT), but even funding that is 20% less than the status quo manages growth in delay far better than no mobility funding at all.

If funding is available, the recommended biennial investment level for highway mobility is $51 million. This will fund all highway mobility project candidates with a benefit to cost ratio greater than two, a 2 to 1 return on investment.



Bridges

Assets -- 2967 Structures

- 21 extraordinary bridges (≥ 250' and ≥$5 million in need)
- 1,962 bridges (≥ 20')
- 775 minor spans (> 10' and < 20')
- 209 low use (<100 AADT) or redundant bridges (shared capital responsibility only)
- 368 steel culverts (included in bridges and minor spans above)

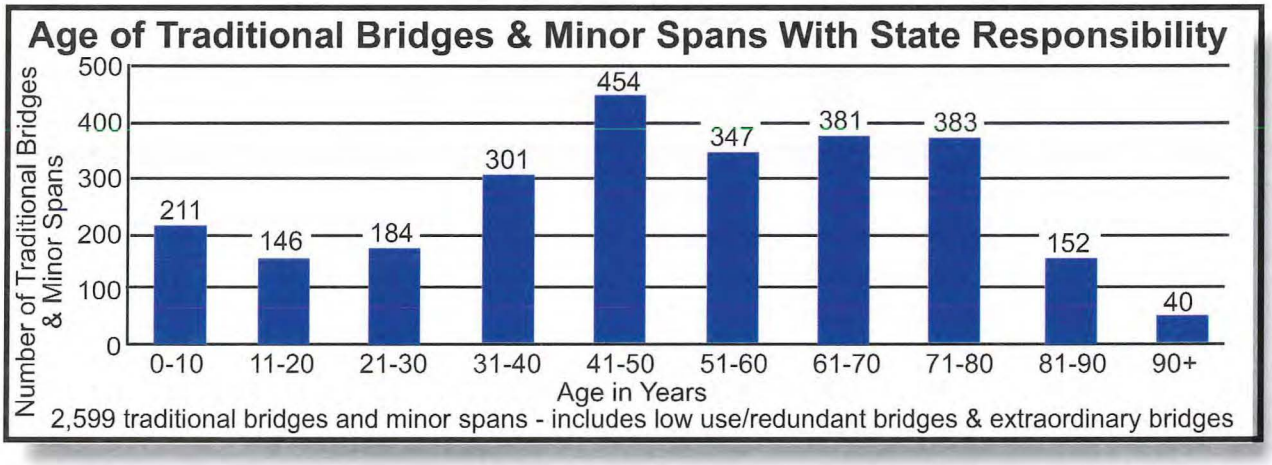
As of 2004, 192 of the traditional structures have exceeded their normal service life of 80 years, more than twice the number reported in the 2002 State of the System Report. Of this number, 12 structures (6%) have already been programmed for capital improvement.

Bridge Adequacy

An effective method of assessing the overall condition and functionality of Maine's structures is to use the average Federal Sufficiency Rating weighted by deck area. Weighing the sufficiency ratings by deck area will more accurately reflect the condition of the total bridge network because more weight is given to the sufficiency ratings of the larger structures which represent a larger proportion of investment in the bridge network.

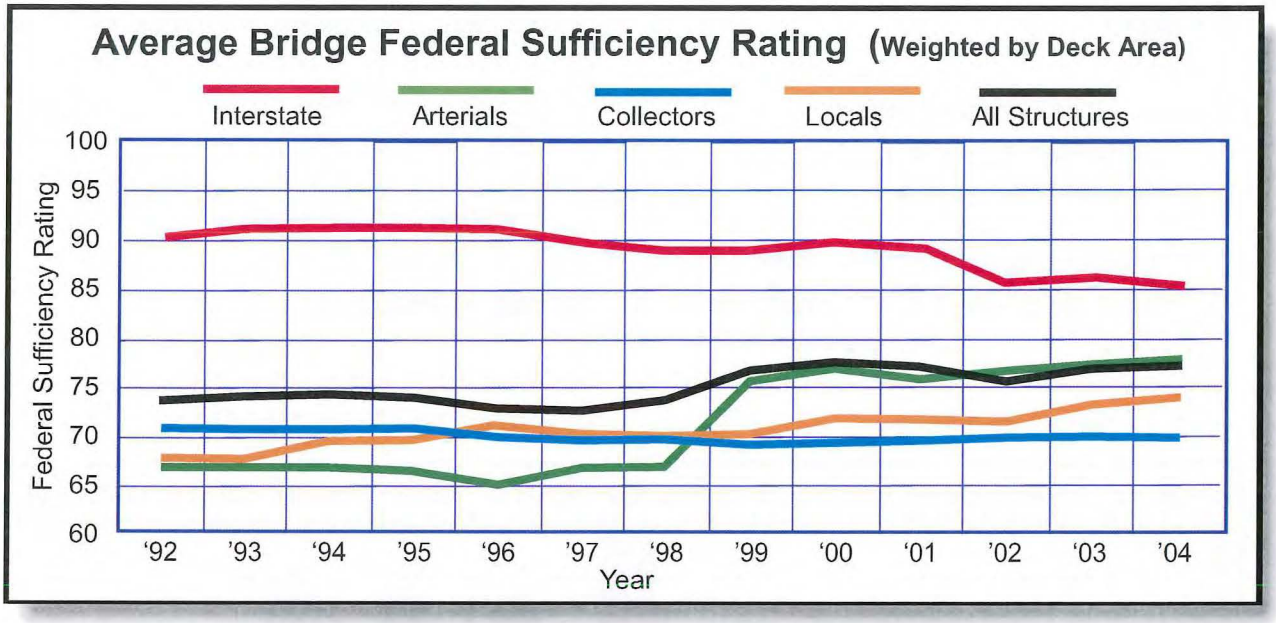
This indicator has proven quite consistent over time. The significant increase in 1999 for bridges carrying arterial highways is attributed to capital improvement projects to eight large structures.

The following 1992 to 2004 chart is based on the ratings of all 2,967 structures for which the state has responsibility, including extraordinary bridges.



The State of Maine has full responsibility for capital improvement and maintenance of 775 minor spans (10 feet to 20 feet long) and 1,962 bridges generally equal to or greater than 20 feet in length, and 21 extraordinary bridges. Bridges that are 250 feet or more in length and require improvements of at least $5 million each in the next 20 years are considered Extraordinary Bridges. The State of Maine has shared responsibility for capital improvements only for 209 low use or redundant bridges on town ways.

Of the 2,967 structures with state responsibility, 368 are bridge/minor span steel culverts and 2,599 are traditional structures. The steel culverts typically have a service life of about 50 years, while the traditional structures normally have a service life of about 80 years.



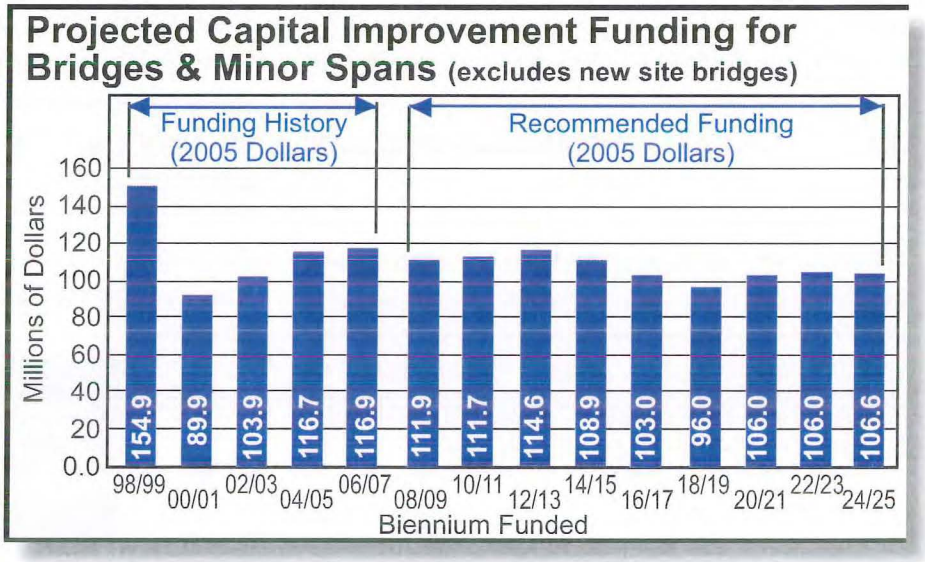
As one might expect, the structures carrying higher federal functional class roadways are in the best condition, reflecting MaineDOT's commitment to funding improvements for those structures that carry the most traffic and thus afford the most benefit to Maine's people and economy.

Bridge Needs

The scopes, costs, and timing of future improvements were individually determined using inspection ratings and inventory data, and based in part on field reviews conducted by bridge engineers and environmental scientists.

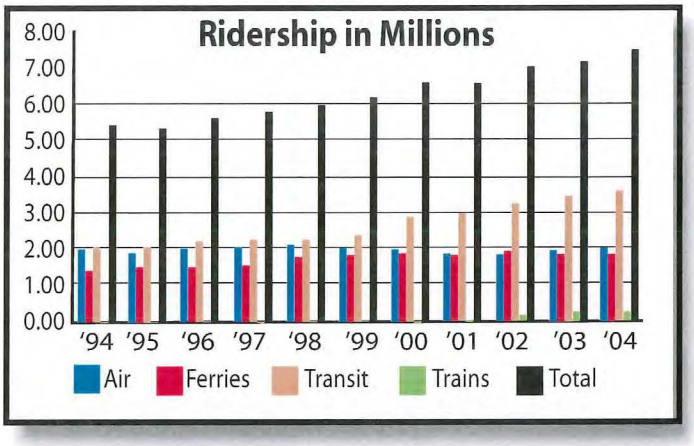
The figure below depicts the funding projections needed to address all the bridge, minor span, and the extraordinary bridge needs anticipated statewide over the next 20 years.

Though the strategic need for bridges is estimated to be $148 million, the recommended 08/09 investment level for bridges is $112 million. This level of biennial investment should keep the bridge network in its current condition.



Passenger Transportation

- 6 commercial airports
- 30 general aviation airports
- 18 fixed route transit systems
- 42 miles of active passenger rail service (Amtrak Downeaster)
- 7 State of Maine owned ferry vessels
- 10 GO MAINE vanpool routes
- 2,000 park-and-ride spaces (some shared ownership with MTA)
- 1 intermodal passenger facility
- 1 Commuter/Intercity Rail System

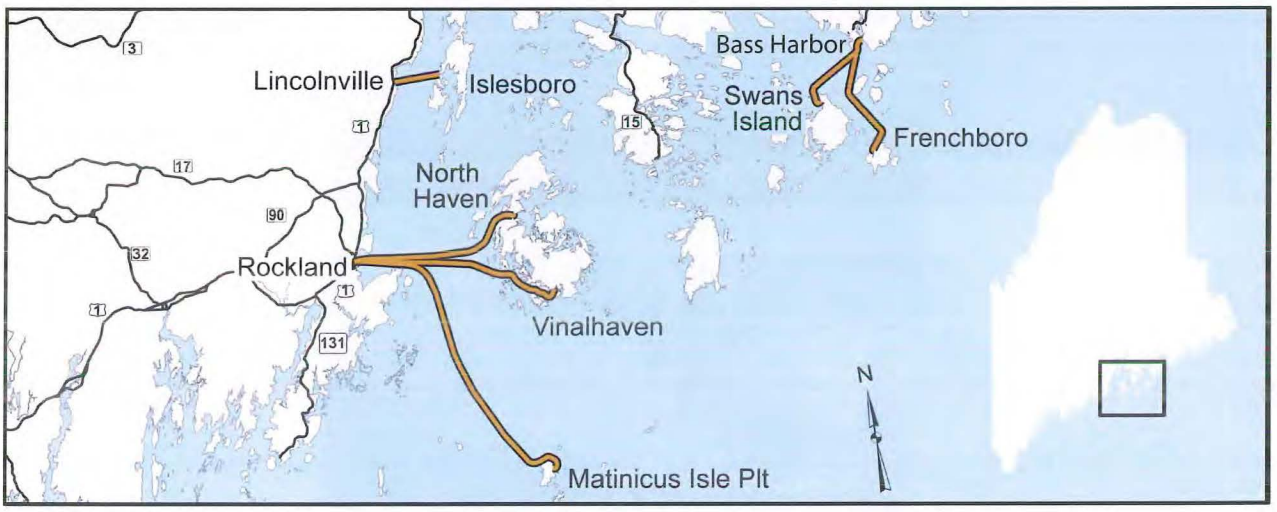


Ridership

As can be seen in the preceding graphic, from 1994 to 2004 ridership on ferries, airplanes, trains and buses in Maine grew by more than two million riders, from 5.35 million to 7.58 million, a 42% increase. Airport use has rebounded since the September 11, 2001 terrorist attacks, with over two million passengers in 2004. Ridership on buses and rail is expected to continue to increase as petroleum prices remain high.

Marine

Maine is served by a variety of public and private ferry services. The Maine State Ferry Service (MSFS) serves six year-round island communities. In recent years the MSFS has implemented an aggressive maintenance program for vessels and facilities including two pending projects which are currently in the final stages of planning/funding. The projects are: 1) New Ferry to replace the *Gov. Curtis*, at a cost of $7 million. The *Gov. Curtis* would then become the primary spare/backup ferry. 2) Completion of Phase II of the Rockland Terminal/Wharf project. Other key projects (in order of priority) which require planning/funding are:



- Replacement of the Swan's Island Ferry Pen,
- Replacement of the Lincolnville and Islesboro Transfer Bridges,
- Re-power *Gov. Curtis*, *Everett Libby*, and *Margaret Chase Smith* with low emissions engines,
- Construct new terminal building on Swan's Island.

Air, Rail, Transit and Trail Strategies

Passenger transportation is vital to addressing mobility needs of Maine's citizens and to address highway congestion. While state and federal funds have been adequate to meet capital needs, ongoing operating funds remain a concern for transit providers. Maine must develop sustainable operating funding sources for passenger transportation to ensure the continuation of services.

The average biennial Passenger Transportation investment level has been $ 114.3 million. The strategic investment level for 08/09 is $ 163.2 million. This increase in funding will provide:

- Commuter rail service into Portland: This would include infrastructure investments to support commuter rail from Portland to Yarmouth and future expansion of the Downeaster passenger rail service from Portland to Freeport and Brunswick.
- A sixth daily round trip on the Downeaster passenger rail service between Portland and Boston will significantly increase Downeaster ridership (100 % increase over base ridership projected in 2020) and provide two daily round trips to Freeport and Brunswick.
- Calais Rail/Trail
- Acadia Welcome Center
- Conversion of transit fleets and passenger rail to clean fuels
- Restoration of the State aviation program for pavement management and obstruction removal at Maine's public airports.

Freight Transportation

- 3 major cargo ports
- 1,200 miles of active rail line
- 230 miles of inactive rail line
- 300 miles of State of Maine owned rail line
- 2 rail/truck intermodal facilities
- 3 major freight carrying airports

MaineDOT supports the development of a free-flowing intermodal freight system that provides Maine shippers more choices among modes, increased productivity, improved environmental benefit, better balance between modes, and reduced transportation costs. This is a difficult challenge.

- The state's major investments in cargo port assets include the following:
  - The Estes Head Cargo Pier and warehouses in Eastport
  - The Mack Point Dry Cargo Pier in Searsport
  - The International Marine Terminal in Portland
- Air freight is an important component of Maine's current freight transportation system that is experiencing rapid growth (7 to 10 percent annually).
- Motor carrier related projects have emphasized improved truck freight flow safety and efficiency, as well as improvements in enforcement capabilities in the field.
- Freight railroads are classified by the Federal Rail Administration based on annual operating revenue as follows:
  - CLASS I - Annual revenues of greater than $258.5 million
  - CLASS II - Annual revenues between $40 million and $258.5 million
  - CLASS III - Annual revenues of less than $40 million.

Maine has no Class I service, but its Class II carriers connect with four Class I railroads in New York, Montreal, and St. Leonard, New Brunswick. Railroad companies in Maine move more than 8 million tons of freight per year over 1,200 miles of active track.

Freight Needs

- Cargo Ports- $11.8 million/biennium will be needed to meet the needs of port development and to truly maintain Maine's position relative to international cargo shipping.
- Freight Rail- $7.6 million/biennium would allow improvements to State-owned trackage, fund a $2 million IRAP program, and allow improvements to important interchange yards.
- Motor Carrier- $3.9 million/biennium would allow for more extensive improvements in vehicle screening and credential monitoring,
- Air Freight- $500,000/biennium would allow MaineDOT to partner with private air freight couriers on air freight opportunities.

Though the average biennial Freight Transportation investment level has been $5.6 million, the recommended strategic investment level for 08/09 is $ 23.8 million. This increase in funding will address the needs detailed above.

Intelligent Transportation Systems

Sometimes travel can be a challenge. The challenges can include winter weather conditions, and increased numbers of vehicles, especially during peak tourist season. In addition, vehicle incidents can cause delays on particular corridors where there are few alternative routes.

The application of electronic and communications technology can help to relieve some of these problems. These technologies, collectively labeled as Intelligent Transportation Systems (ITS), have potential benefits in the following areas:

- Capital, operations and maintenance cost savings
- Safety and security
- Energy and environment
- Service quality
- Efficiency
- Productivity.

The Department has made significant strides since the first State of the System Report in 2002 in developing ITS strategies to address these needs.

The TRavel Information Online, TRIO, program provides accurate and real time information on road conditions, road work, weather alerts and advisories, incidents, local events and any major delays that occur on the highway system. Travelers can make informed decisions before and while on their trips using their phones and by looking for information on the internet at MaineDOT's 511 websites.

MaineDOT launched the 511 website and 511 interactive telephone voice response systems in 2003. These were the first deployments of dissemination systems providing real time travel information to the public through the Condition Acquisition Reporting system. Information includes:

- Highway Traffic
- Ferry Service & Transit
- Major Delays
- Roadwork

- Winter Road Conditions
- Road Closures

Much of MaineDOT's ITS deployment program is in its early stages. The effectiveness of various initiatives has not been fully evaluated, though early indications are very favorable for several initiatives. For example, public use of the 511 system has grown dramatically since it's inception in 2003. Also, 90% of respondents in a customer survey indicated that transit information signs made it easier to get around Acadia National Park on the Island Explorer.

The ITS Program from the MaineDOT ITS Strategic Plan for the next ten years includes about $30.6 million worth of ITS projects based on a statewide needs assessment. The recommended 08/09 strategic investment level is estimated at $6.6 million. Projects include:

- Statewide Architecture
- Traffic Management including arterial traffic management systems, traffic incident management systems and traveler information systems
- Road weather information systems
- Work zone management and safety systems
- Commercial vehicle credentialing and screening systems
- Transit computer aided dispatch/ automatic vehicle location systems.

Maine's Transportation System Funding Scenarios (in millions of 2005 dollars)

	'02-'03	'04-'05	'06-'07	Status Quo Investment	Constant Performance/ Condition	Biennial Strategic Need
Definitions				Past Investment Level (Average Over 3 Biennia)	Estimate of biennial $ needed to maintain present performance or condition	$ needed to achieve a strategic objective (s)
Safety	**8.8**	**9.8**	**11.2**	**10.6**	**9.8**	**16.9**
Hazard Elimination	5.3	6.4	8.5	6.7	6.0	9.0
Rail Highway Crossings	2.1	2.5	2.1	2.2	2.2	2.4
TEA-21/SAFETEA [3]	1.4	0.9	TBD	1.1	1.0	3.5
Safe Ways to School	0.0	0.0	0.6	0.6	0.6	2.0
Highway Network	**345.6**	**295.4**	**290.5**	**310.5**	**271.0**	**400.0**
Highway Improvements [1]	172.6	127.9	147.7	152.0	0.0	198.0
Rural Arterials	75.6	75.1	84.4	78.4	0.0	82.0
Major Collectors	77.4	51.0	53.7	60.7	0.0	103.0
Minor Collectors	19.7	9.5	9.6	12.9	0.0	13.0
Pavement Preservation	102.0	97.0	69.6	89.5	111.0	111.0
Maintenance Paving	22.8	30.3	28.2	27.1	40.0	40.0
Highway Mobility [2]	47.5	35.1	34.1	38.9	120.0	51.0
Bridge Network	**103.9**	**116.7**	**116.9**	**112.5**	**112.5**	**147.8**
Extraordinary Bridges	49.5	66.4	75.1	63.7	50.0	70.8
Bridges	45.3	47.1	35.4	42.6	56.5	69.4
Minor Spans	9.1	3.2	6.4	6.2	6.0	7.6
Passenger Transportation	**120.9**	**124.4**	**97.6**	**114.3**	**92.1**	**163.2**
Transit	26.7	37.8	39.6	34.7	31.0	40.0
Airports	43.3	39.5	32.7	38.5	33.0	44.2
Passenger Rail Service	15.2	22.9	9.5	15.9	15.0	50.0
Ferries	17.5	12.8	3.7	11.3	10.6	10.6
Commuter Programs	1.0	0.9	1.0	1.0	0.5	1.5
Bicycle/Pedestrian	7.4	10.6	9.1	9.0	1.0	10.0
Intermodal Facilities	9.8	0.0	2.0	3.9	1.0	6.9
Freight Transportation	**6.7**	**4.6**	**5.4**	**5.6**	**4.2**	**23.8**
Cargo Ports	4.8	2.2	2.1	3.0	0.6	11.8
Freight Rail	0.3	0.3	0.9	0.5	1.6	7.6
Motor Carrier	1.6	2.1	2.4	2.0	2.0	3.9
Air Freight	0.0	0.0	0.0	0.0	0.0	0.5
ITS			**4.6**	**4.6**	**1.0**	**6.6**
GRAND TOTAL	**585.9**	**550.9**	**526.2**	**558.1**	**490.6**	**758.3**

1 Highway improvements are typically applied to unbuilt roads. The treatment applied to keep these roads in their present condition is Maintenance Paving; therefore, the 'highway improvement' cost is zero.

2 For Highway Mobility, the Strategic need represents a realistic funding of the highest benefit improvements. The high cost to maintain constant performance (growth in delay not exceeding growth in use) reflects that much of Maine's arterial system operates at a high mobility performance level.

3 TEA-21/SAFETEA funds have been used for a combination of on-road safety improvements, support to address municipal safety needs, and public outreach.

3.0 Safety

3.0 Safety

MaineDOT continually evaluates the safety needs of the state's transportation system. The Department's Work Plan incorporates both highway improvement projects that include safety features and dedicated projects that focus on an identified priority safety need. MaineDOT's approach to selecting safety projects will be covered in the next several pages.

In 2004, there were 35,226 crashes that resulted in 192 fatalities and 14,700 injuries. Police crash report data provides detailed information that enables assessment of future needs and past safety performance. A police report must be filed whenever a collision results in combined damage of $1,000, bodily injury or death. MaineDOT maintains a database for all police-reported crashes that have occurred on all public roads since 1989. This section will discuss crash data for the 10-year period of 1995 through 2004 and provide an overview of Maine's recent crash performance, how it compares with national data, and cover leading crash trends. Engineering efforts are one key component to achieve improved road safety – but to fully address safety needs, other coordinated efforts are necessary in the areas of Enforcement, Driver Education and Emergency Services response. This report section will also provide an overview of additional MaineDOT transportation safety initiatives including development of an inter-agency comprehensive Strategic Highway Safety Plan.

3.1 Social & Economic Impact

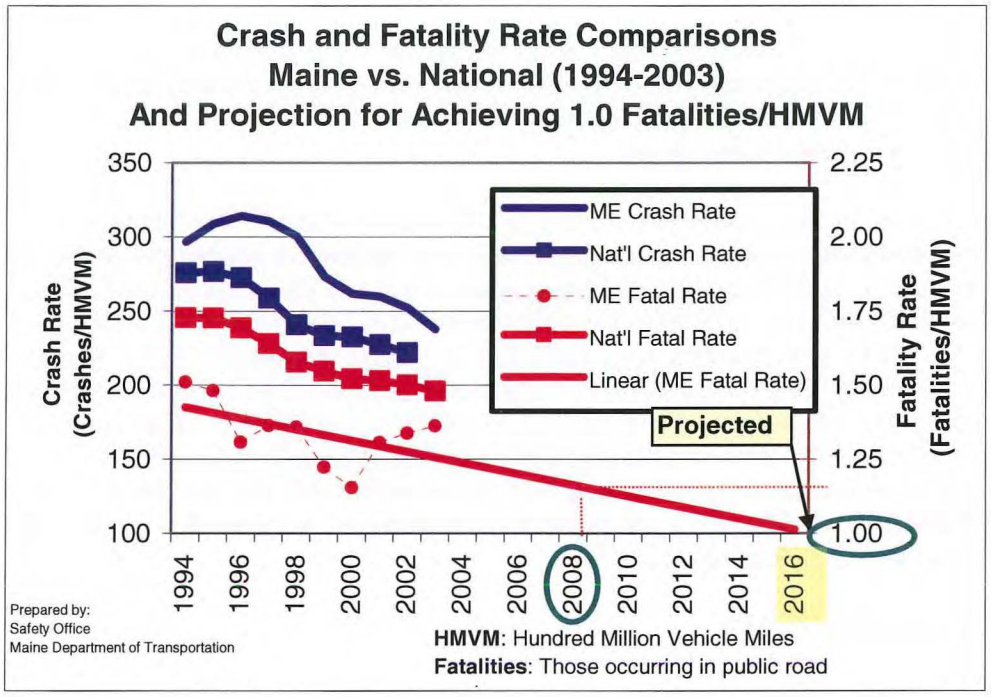
Motor vehicle crashes in Maine result in significant economic and societal impacts. The economic impact of crashes occurring on public roads in Maine in 2004 was nearly $1.2 billion. This represents about a 10% reduction in economic impact over the past 10 years (economic values are not adjusted for inflation or increased medical costs over the years) and can be attributed to improved roads and safer vehicles. This is during a period when total miles traveled on Maine roads increased by 19%. However, crashes have a deeper effect than estimated economic impact - the toll taken on families and friends who have lost loved ones is immeasurable.

3.2 National Comparisons

Maine's 2004 crash rate, expressed as the number of crashes per hundred million vehicle miles traveled (HMVM) was 237, higher than the latest available national rate in 2003 of 220. Maine's crash rate dropped about 20% from 1995 to 2003. National trends also improved during this period-see figure 3.1.

Highway fatalities on Maine public roads reached a recent high of 204 in 2003 and did decline to 192 in 2004. The 10-year low was 165 fatalities in 2000. There are several leading transportation safety issues that significantly contribute to the number of fatalities, and these will be further addressed in section 3.4. Maine has a crash rate above the national average, but its fatality rate of 1.29 is lower than the national average of 1.46. Maine's fatality rate has dropped 12.8% over the past ten years. Maine ranked 26th in state traffic fatality rates in the latest 2002 comparative listing.

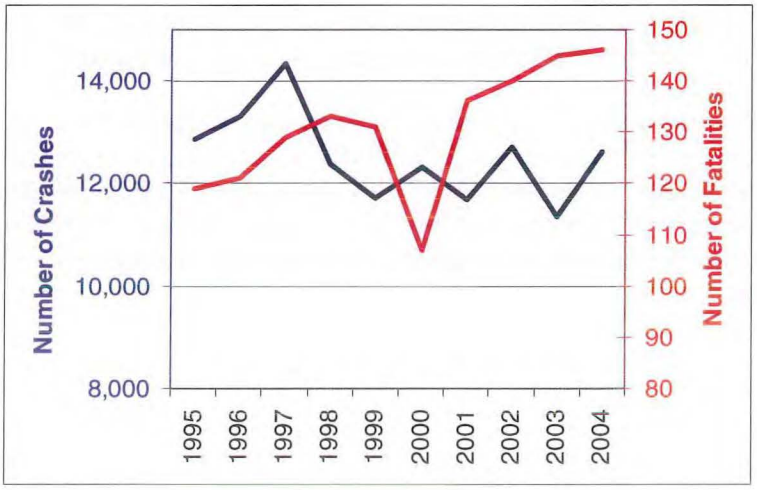
Figure 3.1



3.3 Trends

The state's leading fatal crash type is Lane Departure (Head On and Run off Road) crashes. There were 12,622 Lane Departure crashes (36% of total crashes) that resulted in 146 fatalities (**76% of total fatalities**) in 2004. Unsafe speed is a contributing factor in more than half of rural Run off Road fatal crashes. Crashes are trending down slightly, but fatalities are trending higher (figure 3.2).

Figure 3.2 Lane Departure Crashes and Fatalities

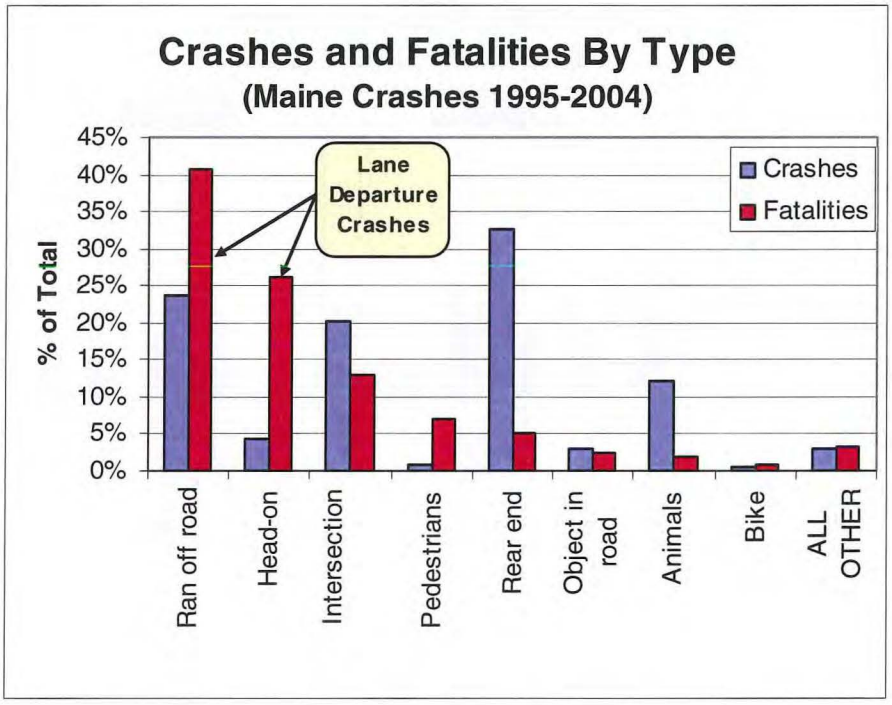


A significant concern related to Run off Road crashes is striking fixed objects including trees, utility poles, and ledge on roadsides that present a serious hazard to vehicles and their occupants. In 2004, there were over 11,000 crashes where a fixed object was struck resulting in 96 fatalities. Figure 3.3 below summarizes the top types of objects struck. Trees are the most frequent fatal object struck, followed

closely by banks and ditches. Utility poles are third in frequency and resulting deaths. As MaineDOT undertakes transportation projects, utility pole locations are reviewed with respect to the current policy. To further evaluate location and corridor utility pole crash problems, crash maps can now be generated for utility companies to identify where utility pole relocations are needed most. MaineDOT has stepped up its program to improve pole location offsets, making improvements on more miles of highway each year.

Another fixed object concern is rigid guardrail ends. An ongoing guardrail improvement program is underway to help minimize the crash severity of vehicles that strike guardrail ends.

Figure 3.3



Nineteen percent of Maine's crashes occur on wintry road surfaces. From 2002-04, over 20,000 crashes occurred on snowy, slushy or icy roads, and these crashes resulted in 66 fatalities. Illegal/Unsafe speed were noted in about 9,500 of the police crash reports and resulted in 38 fatalities.

Crash and fatality data for the most severe crash types from 1995-2004 are shown in figure 3.3. Rural and urban crash type trends differ. Not surprisingly, Run off Road crashes are the most prevalent in rural areas, while Rear End and Intersection crashes are most common in urban locations. Head On crashes represent just 4% of total crashes, but are a severe crash type, accounting for over 25% of all fatalities. Head On crashes tend to be more severe than other crash types due to the combined forces of the opposing vehicles.

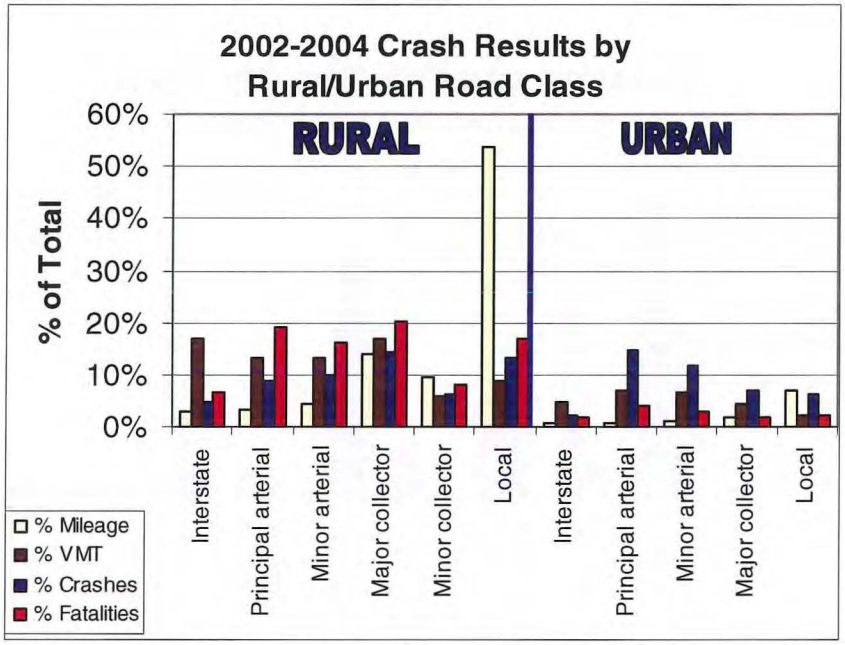
Relative Safety by Road Classification

Maine is a rural state, and this is reflected in the higher number of rural road crashes and their human toll. In Maine, 57% of the crashes and 87% of the resulting fatalities occur on rural roads (2002-04 data). The percentage of fatalities and total economic losses are significantly greater in rural settings for any given road class.

3.0 Safety

Interstate roads are the safest roads in Maine, as is illustrated in figure 3.4. This is primarily because the interstate system is designed to a high standard including significant clear zones along the roadside. Clear zones are roadside areas free of obstacles that also allow vehicle recovery. MaineDOT continues to improve clear zones on non-interstate roadsides to provide improved ability for vehicles to safely recover from problems. Close roadside proximity of trees, utility poles, culvert ends, embankments and stone/ledge all are evaluated in project design. Also, the interstate roads are divided and have controlled access, so there are few traffic conflicts. Vehicles travel in the same direction and side friction is introduced only periodically at on and off ramps and when lane change maneuvers occur.

Figure 3.4



Local roads exhibit the greatest ratio of crashes and fatalities per mile driven for both urban and rural road classes. This is likely due to the additional traffic conflicts caused by stopping vehicles, turning traffic and lower design standards (local roads are not designed to the standards as state roads). Local roads account for approximately 60% of the total public road mileage in Maine but only 10% of the vehicle miles traveled.

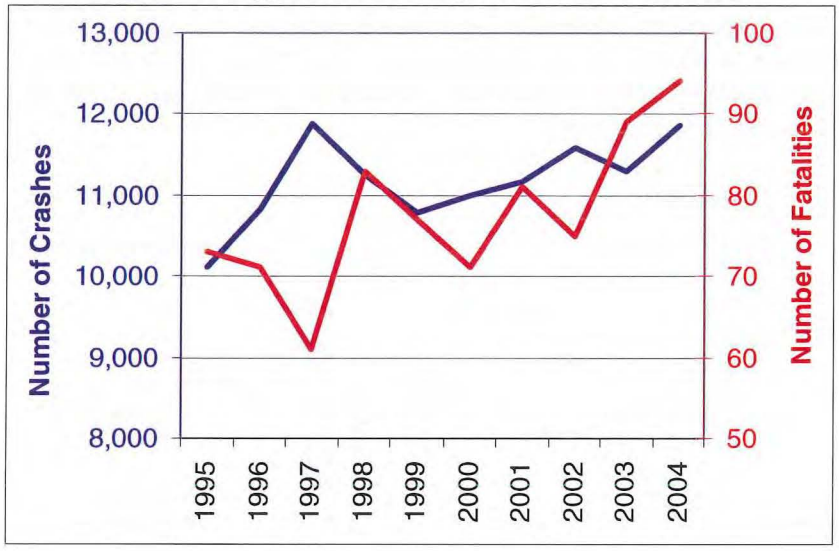
Leading Driver Contributing Factors

MaineDOT continually looks at improving road design to improve safety; however, driver behavior is often the underlying story of crash causation. The primary contributing factors (driver elements) for crashes in Maine are Driver Inattention (38%), Illegal or Unsafe Speed (17%), Failure to Yield Right of Way (15%) and Following Too Close (9%). Illegal/Unsafe Speed is the deadliest contributing factor, related to nearly 40% of Maine's traffic fatalities. Failure to Yield crashes may sometimes be the result of limited sight distances at intersections or difficulties for drivers to identify an upcoming intersection both of which can be improved with engineering solutions; but also, there are often other contributing factors related to driver behaviors.

Aggressive driving considers several factors where risky behaviors are cited in police crash reports (Disregard of Traffic Control Device; Following Too Close; Illegal or Unsafe Speed; Improper Passing; or Improper, Unsafe Lane Change). There has been an increasing trend of Aggressive Driving crashes in Maine (see figure 3.6 below). Aggressive driving as a proportion of total crashes (especially Speed-related) continues to grow – now at 33.7% (was 31.9% - 2003; 31.4% - 2002) of total crashes and 49% of total fatalities (38.3%-2002; 43.6% - 2003.) Speed is the leading Aggressive Driving concern. In 2004,

there were 6,611 Speed-related crashes, resulting in 83 fatalities (compared to the annual fatality average of 66 during 2000-02).

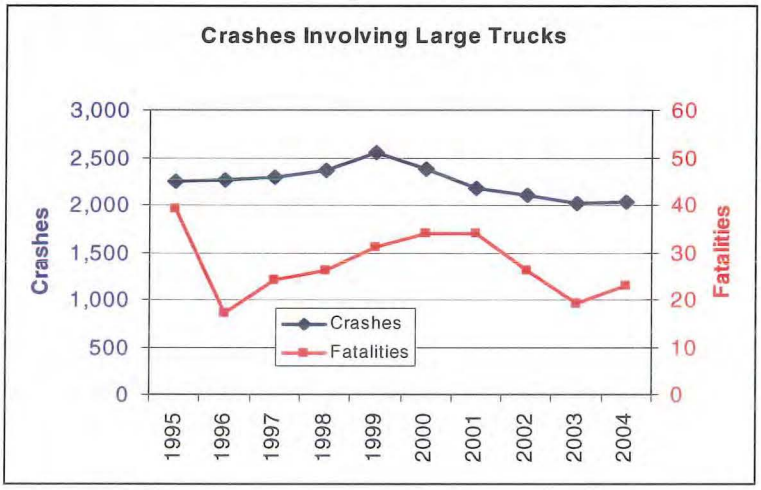
Figure 3.5 Aggressive Driving Crashes and Fatalities



Commercial Vehicle Safety

In 2004, there were over 2,032 crashes involving large commercial trucks (not including vans or pick-up trucks) on Maine's public roads. This number is down from the 10 year high of 2,550 crashes in 1999 (figure 3.6). Increased numbers of larger trucks/tractor trailers are being used primarily because they can carry additional weight. Their axle configuration actually decreases road wear. A typical six-axle vehicle carrying 100,000 pounds causes about 7% less pavement consumption than a five-axle trailer carrying 88,000 (maximum allowed for some special commodities such as concrete products, pulp wood, logs, wood chips or farm produce). (Note: Neither of the vehicles described would be allowed on Maine Interstates, but they would be allowed on the Maine Turnpike.) The result of this shift to larger truck combinations is that fewer vehicles can carry more product with less road degradation, and also an overall decrease in truck units on the road. Although these trucks are less problematic in terms of impact to the road, safety implications are likely to arise and will require close monitoring. Commercial vehicle use is expected to grow well into the foreseeable future, though truck-to-train intermodal facilities have also increased in use.

Figure 3.6



3.0 Safety

Bicycle and Pedestrian Safety

Both bicycle and pedestrian crashes have decreased over the last 10 years. This decrease in crash frequency is probably due to two factors. The first is that there may simply be fewer people bicycling and walking. However, it is also fair to assume that part of this decrease is due to construction of better facilities through paved shoulders, sidewalks, and shared use paths, as well as extensive outreach in bicycle safety education in Maine schools and promotion of a "Share the Road" ethic through advertising and signage. Safety for this traveling segment will continue to be addressed as biking and walking activities are advocated to improve public wellness.

Figure 3.7

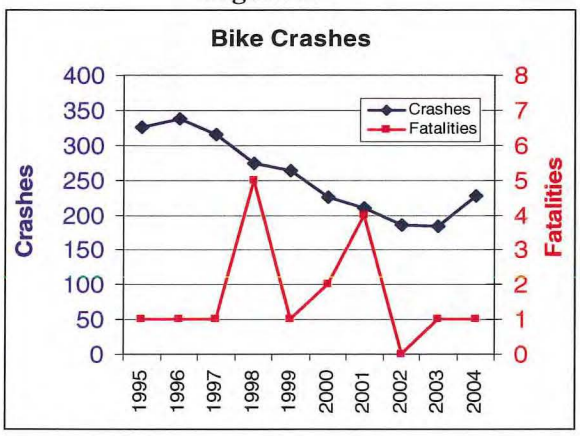
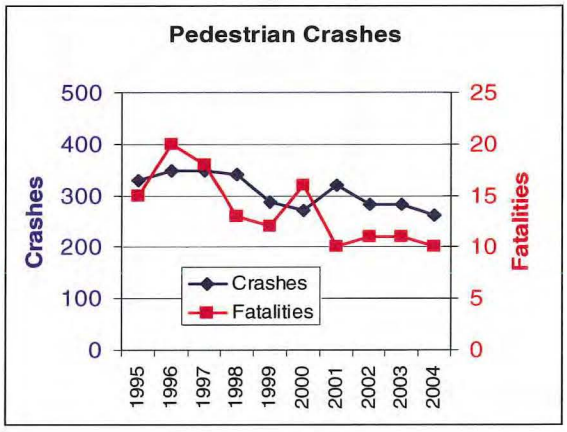


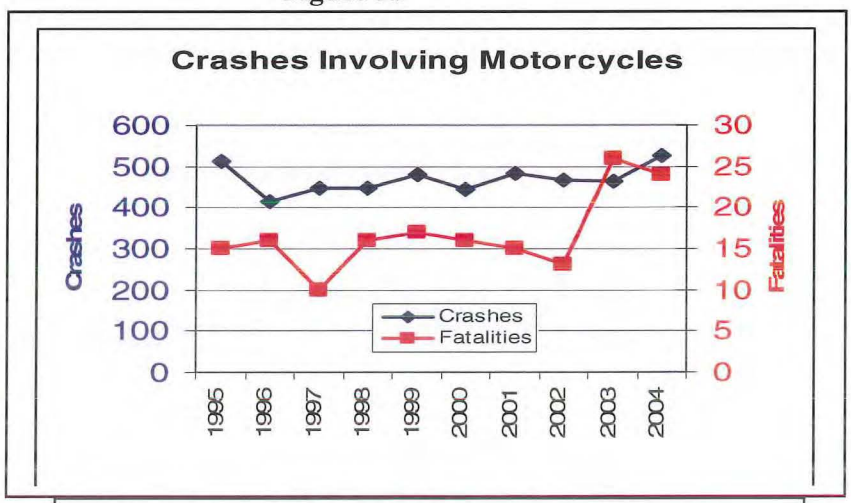
Figure 3.8



Motorcycle Safety

Motorcycle crashes have resulted in increased fatalities during the last two years. This follows a national trend showing an increase in rider deaths. The leading age group of motorcycle fatalities is 45 to 54 year olds, followed closely by 35-44, 16-24, and 65+ year olds. This reflects a continuing upward shift of driver age related to motorcycle operation and crash involvement similar to what is being seen nationwide.

Figure 3.9



Includes vehicle types of Motorcycle and Motorbike.

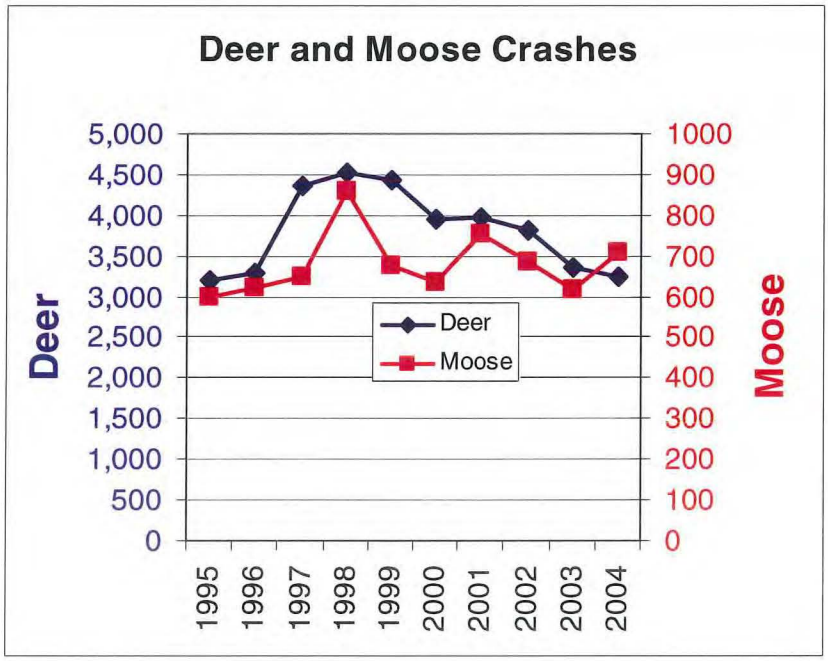
3.0 Safety

Crashes with Animals

Collisions with moose increased from 596 in 1995 to 707 in 2004. The number of crashes involving deer trended up, then back down during the past 10 years, with crashes for 2004 being slightly higher (3,203 in 1995 compared to 3,246 in 2004). From 2002 through 2004, there were 9 fatalities resulting from moose crashes and 2 from crashes with deer. (Figure 3.10)

MaineDOT is working with the Maine Department of Inland Fisheries and Wildlife, the Office of the Secretary of State, the Department of Public Safety, Maine State Police, MTA and others to address concerns resulting from crashes involving large animals, particularly moose. Through this group, a short video was produced on crashes involving moose for inclusion in all driver education courses. A new version of a Moose and Deer safety brochure has been produced, as well as an updated Moose and Deer crash map. In addition to these public outreach activities, MaineDOT intends to continue participating with the multi-agency work group and has been implementing pilot projects in efforts to reduce the number of crashes involving large animals.

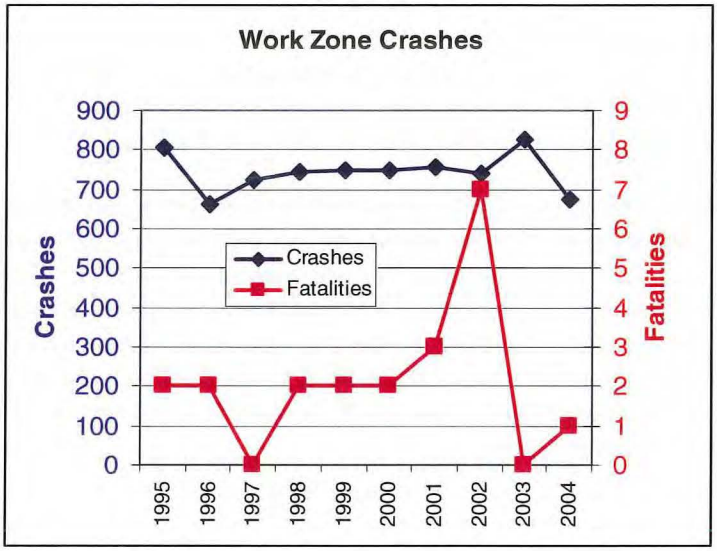
Figure 3.10



Work Zone Crashes

Maine experiences about 700 crashes in roadway construction, maintenance and utility work zones each year. These crashes have resulted in 21 fatalities during the past 10 years. Workers in these zones are particularly vulnerable, but drivers too are at risk, and actually are more often injured in Work Zone crashes. MaineDOT's Safety Office has ongoing efforts to make sure that Work Zones are safe for MaineDOT employees, contractors and others working in these areas, as well as for the traveling public.

Figure 3.11



3.4 Maine's Strategic Highway Safety Plan

Traffic safety has many stakeholders, including MaineDOT. In late 2004, various state agencies and other safety advocates embarked on a coordinated effort that combines resources to develop common strategies to address Maine's leading safety concerns. This coordinated approach is intended to bring focus, efficiency, and common messages to the state's road users. Four core safety concerns have been identified: **Seat Belt Usage; Lane Departure Crashes; Aggressive Driving; and Older/Younger Drivers**. Each focus area considers the USDOT "4 E's" approach to highway safety—**E**ngineering, **E**nforcement, **E**ducation, and **E**mergency Services. The Engineering aspect is automatically considered part of MaineDOT's role, but MaineDOT is involved in the other three "E's" as well.

MaineDOT works with several interagency groups including the Maine Transportation Safety Coalition (MTSC). The MTSC is the largest, most comprehensive safety organization in Maine counting among its members many state agencies and private entities. MaineDOT helped lead the production of MTSC's comprehensive state crash report titled **The Status of Transportation Safety in Maine** and its subsequent annual updates. This crash data analysis is an important ingredient in identifying priority safety needs and monitoring performance.

Lane Departure is the most engineering-focused of the four core safety concerns. Corridors having higher concentration of lane departure crashes have been identified and are undergoing an intensive Road Safety Analysis that will target the best improvement strategies and determine the most cost beneficial safety project locations. Safety improvements may include such elements as improved signs and pavement markings, the use of Intelligent Transportation Systems (ITS), improved shoulders, curve redesign (such as increased radius or improved super-elevation), traffic calming, rumble strips, creating safer passing zones and providing roadside areas of safe refuge (for emergencies and speed enforcement). Related Enforcement and Education strategies will also be addressed.

Public Awareness Initiatives

In 2002, MaineDOT launched a media campaign in partnership with TV stations in major media markets intended to increase public awareness on the various issues affecting transportation safety in Maine. Over time, this increased public awareness has aimed to change driver behavior and attitude, resulting in

improvements to transportation safety in Maine. MaineDOT employs the slogan "Be A Road Model" to capture the need for all drivers to be a positive example on the road and to their young passengers who may be taking future cues on how to drive safely. This federally funded media effort is an important aspect of improving safety, since more than 80% of all police accident reports indicate some form of human error.

Since 2001, MaineDOT has also conducted successful Work Zone Safety Awareness Week public awareness activities including a well publicized Design-A-Poster contest that each year generates hundreds of entries from Maine fourth graders; a MaineDOT employee contest; and a general public contest. The emphasis of this program is to protect both workers and motorists in highway work zones by raising everyone's awareness of workzones.

3.5 Hazard Elimination Program

The Hazard Elimination Program (HEP) funds projects whose primary purpose is to improve road safety. The HEP currently addresses two road safety areas:

- Existing high hazard locations
- Areas not meeting minimum safety standards

To address existing high hazard locations, MaineDOT maintains a statewide crash database. Each year, statewide average crash rates are calculated for various road classifications and urban/rural designations. High hazard locations are identified by comparing all locations to the appropriate statewide average crash rate. Those locations exhibiting a statistically significant higher crash rate than the average (for all other similar locations with similar traffic exposure) and that have experienced at least eight crashes within the most recent three-year period are termed High Crash Locations (HCLs).

Filters such as crash rate, severity, economic value and identified patterns are applied to all crash locations, including HCLs, to obtain a manageable number of candidate projects. Municipal and general public requests for safety projects are also considered. Of the prioritized list of locations, 75 are typically reviewed each year. Life cycle cost for capital improvements are compared to anticipated injury cost reductions. Those locations exhibiting the greatest crash cost reduction (benefit) to life cycle (capital plus operational) cost get funded first. Thus, eligible projects are ranked in descending order and funded until all funds are depleted. Project opportunities that are related to improving results in identified core areas of Maine's Strategic Highway Safety Plan are also sought.

The HEP is used to address locations that do not meet minimum safety standards. These are systemic enhancements shown to have high benefit-to-cost ratios, such as guardrail improvements.

By federal regulation, the HEP must be directed to all public roads, including local roads. The federal participation rate is 90%. State money is used for the 10% match, except when municipalities provide the 10% match for projects on their local roads. Recent projects include intersection improvements such as traffic signal installations or upgrades, realignment and lane additions. Non-intersection improvements have included roadside clear zone improvements and guardrail upgrades.

Completed projects are reviewed for safety performance, comparing crash and related injury experience for 3 years before to 3 years after. A Benefit-to-Cost Ratio over 1.0 reflects a good return on investment. The latest review of HEP project performance shows an overall Benefit-to-Cost Ratio of 8.18 for projects completed between 1997 and 2000. The overall crash reduction resulting from completed projects in this time period is 32.2%. The overall reduction in the economic impact of those crashes is 63.5%. These reviews also provide MaineDOT an indication of what types of projects offer the best safety return.

3.0 Safety

3.6 Funding Scenarios and Implications

Further discussions on needed funding are found in Section 3.7 Conclusions below. To achieve system safety needs and bring about the targeted goals to preserve life and prevent economic loss on our highways, significant resources are required. Additional funding would be expended in areas that would have the most impact on saving lives. Two leading areas where increased funding can yield significant safety performance improvements are:

Lane Departure crash mitigation strategies (See related possible safety improvements listed below). This crash type results in 70%+ of Maine's fatalities; and

Public Outreach (Since the underlying cause of crashes almost always has a driver behavior element). Strategies to bring about changes to improve poor driving behaviors are extremely important, but influencing driver behavior is a difficult challenge. A plan needs to be developed that helps affect the underlying risk taking tendencies in drivers, and that reaches all ages. Behaviors are molded at a very early age, so outreach should be further built upon the fourth grade Work Zone Awareness program that MaineDOT has initiated, and be further emphasized through driver's education and beyond for the experienced driver. Such an effort should be a cooperative venture with key safety stakeholders including Department of Public Safety/Bureau of Highway Safety, BMV, Department of Health, MTA and others.

3.7 Conclusions

3.12 Maine's Transportation Safety Needs (in millions of 2005 dollars)

Safety	2002-2003	2004-2005	2006-2007	STATUS QUO Investment Level (Average Over 3 Biennia)	To Maintain Constant Performance/ Condition	Biennial Strategic Need
Hazard Elimination	5.3	6.4	8.5	6.7	6.0	9.0
Rail Highway Crossings	2.1	2.5	2.1	2.2	2.2	2.4
TEA-21/SAFETEA [1]	1.4	0.9	TBD	1.1	1.0	3.5
Safe Ways to School	0.0	0.0	0.6	0.6	0.6	2.0
Total:	**8.8**	**9.8**	**11.2**	**10.6**	**9.8**	**16.9**

MaineDOT's safety efforts have been effective. MaineDOT's application of funds to dedicated safety projects have been successful, reducing crashes at safety project locations by 32% and reducing by 63.5% the injury-based economic impact estimate.

Crash and fatality rates have dropped 20% and 12.8% respectively during the past 10 years. Despite this improvement, there is still a public call for traffic safety improvement. The strategic funding need reflected in the above chart is largely related to addressing the national goal of reducing the state's fatality rate to 1.0 fatalities per hundred million vehicle miles by **2008**. Maine is currently at a fatality rate 1.31. At the current funding level it is projected that the 1.0 fatality rate objective would not be met until **2016**.

3.0 Safety

Lane Departure crashes continue at a high rate, with this crash type responsible for over 70% of the state's traffic fatalities. Corridor improvements to bring about crash and fatality reductions can be effective, but costly. To make a meaningful difference in Maine's fatality rate, improvements must be made in this leading fatal crash type. Road system enhancements could include: improved shoulders; safe roadside recovery design; increased curve radius and improved super-elevations; other road treatments/traffic calming applications; guardrails; signing including Intelligent Transportation Systems applications that could provide driver feedback on speed, road and traffic conditions; creating safer passing zones; and providing roadside areas of safe refuge to handle roadside emergencies as well as locations from which speed enforcement could be safely administered.

Actions aimed at mitigating Lane Departure crash causal factors (speed, other aggressive driving tendencies, and distraction) are also needed. Therefore, an essential ingredient to achieving traffic safety improvement is influencing driver behavior; that would be accomplished through various forms of **Public Outreach and Education** - funded through both the Work Plan and SAFETEA (federally funded).

Average rail crossing conditions are declining and an aggressive plan to upgrade these and reverse the deteriorating trend is reflected in the strategic need funding target.

MaineDOT is currently well-positioned to address these safety needs. A Safety Office has recently been established, and is working with other state agencies and safety stakeholders to direct the safety agenda in a coordinated manner. Analysis of Maine's crash activity continues, bringing 4 core safety topics to the forefront: Lane Departure Crashes, Seat Belts, Younger and Older Drivers, and Aggressive Driving. Looking ahead, the following are the lead recommendations for success:

- Continued dedication to building a coalition of state agencies and other safety advocates to jointly address the State's transportation safety needs.
- Coordinated efforts within MaineDOT – Planning, Project Development, Maintenance and Operations, Traffic Engineering, Bridge, Safety and others to ensure that safety is a planning-to-pavement activity.
- Continued analysis of Maine's crash performance.
- Continued identification and prioritized selection of locations of safety need, and application of funds to make cost-beneficial improvements. Past efforts have largely focused on intersections. Increased attention to strategies and techniques to reduce Run Off Road and Head On collisions is needed.
- Outreach and support to local municipalities, since 20% of the crashes and fatalities occur on local roads (nearly 30% of total Lane Departure crashes).
- Ongoing assessment of best mitigating techniques to enhance safety in all areas.
- Further emphasis on conducting Road Safety Analysis to identify safety needs to integrate into the project scoping process.
- Use of ITS to better inform drivers of road conditions and help improve driver decision making.
- Much of the safety problem is not directly road-related, but rather driver behavior. Two areas that MaineDOT can support are:

    - **Enforcement –** MaineDOT can provide police agencies information on speed – related crashes to help focus on areas of needed enforcement.
    - **Education –** includes driver education, general public outreach, and media messages. There is interest from several agencies in partnering on this effort, which would best utilize financial and human resources to create a quality, effective product.

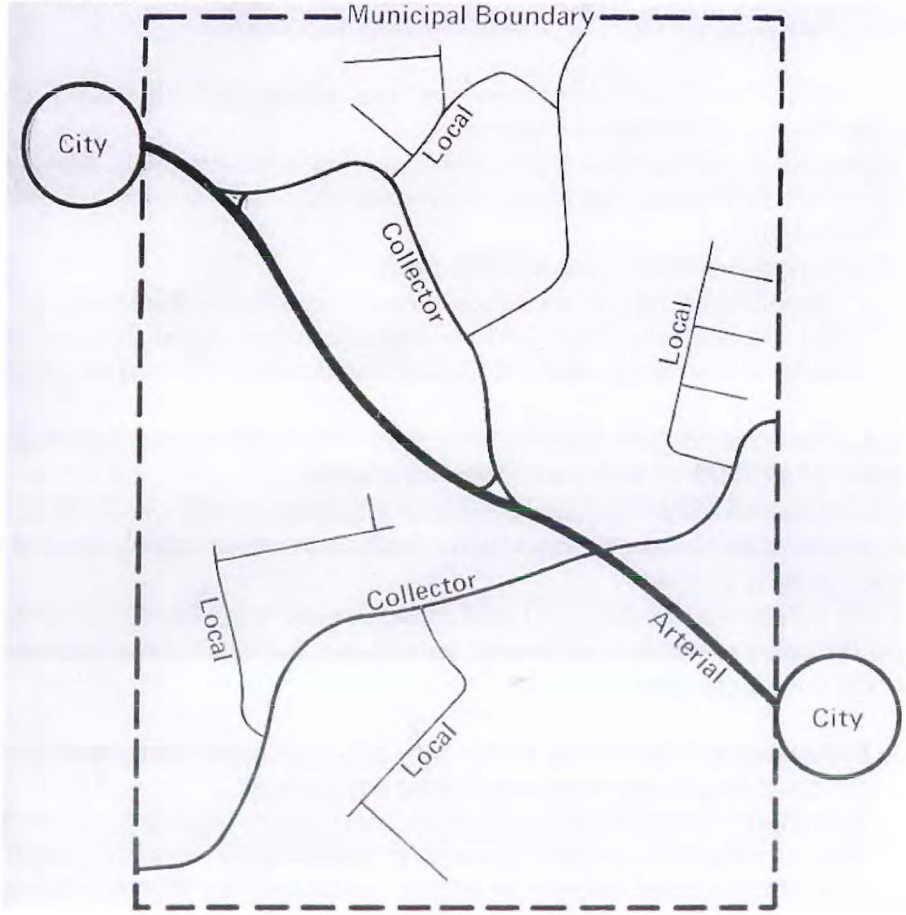
4.0 Highways

A backbone of Maine's transportation system is its highway network. The overwhelming majority of people and commodities are moved over the State's public roads and highways. MaineDOT is responsible for 37% of the public road network and 78% of all highway travel in Maine occurs on these roads. Maine's investment in maintaining, developing and upgrading this highway infrastructure is significant. MaineDOT's goal is to cost effectively maintain and protect this investment and upgrade substandard components of the highway system to modern standards. The following details the condition, performance and needs of Maine's highway network.

4.1 The State of Maine's Highway Network

- 22,750 miles of public roads
  - 8,368 miles state owned
  - 13,930 miles town ways
  - 452 miles other (Maine Turnpike, reservation, parks, etc)
  - 1,955 miles of unbuilt roadway
  - 1,854 miles of seasonally posted roads
- 27,459 cross culverts
- 28,400 entrance culverts
- 1,590 struts (culverts > 5' & < 10')
- 4.32 million feet of guardrail

Highway Functional Classifications



4.0 Highways

Arterial Highways provide for substantial Statewide or interstate through travel for large traffic volumes at generally high speeds with minimum interference. Depending on their location and function, arterials are categorized as Rural or Urban and as Principal or Minor.

Major Collector Highways are outside federal urban areas and serve important intracounty travel corridors that connect consolidated schools, shipping points, important agricultural areas, etc. with local roads.

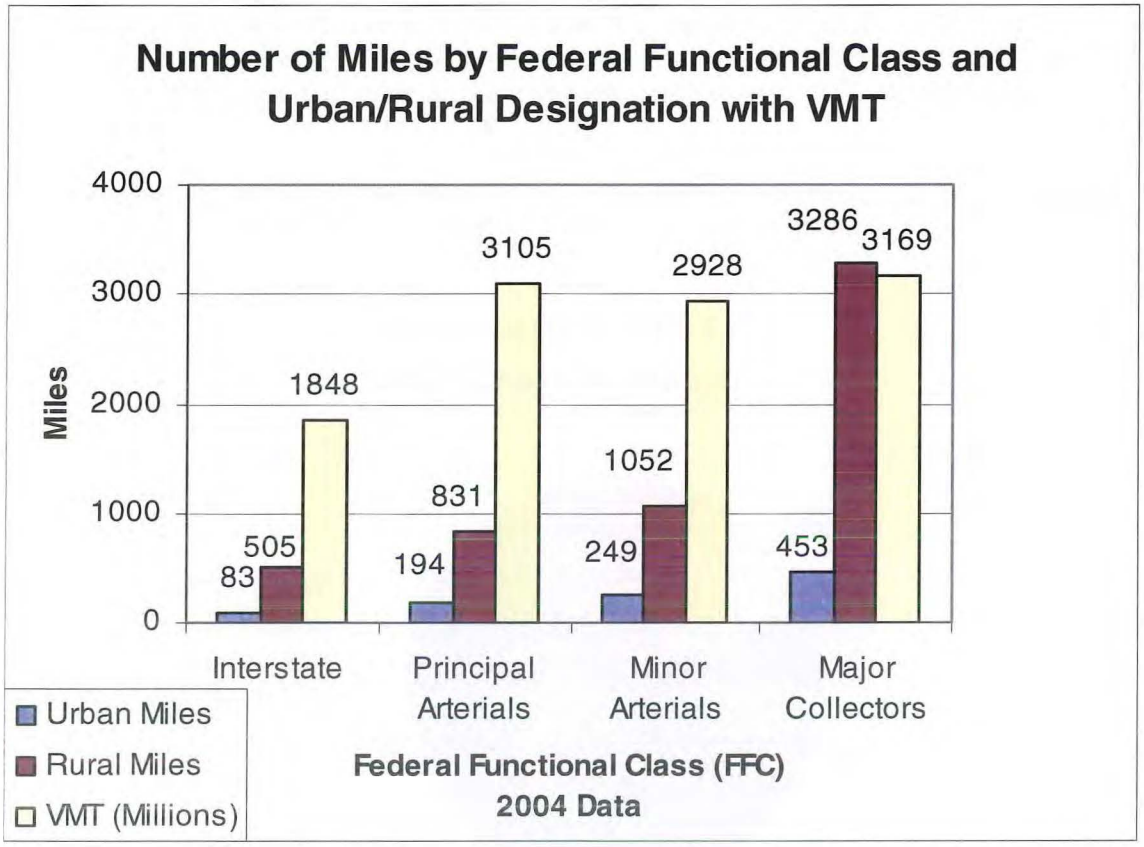
Urban Collectors are collector highways inside federal urban areas.

Minor Collectors provide service to smaller communities and link locally important traffic generators with arterial and major collector highways.

Local Roads provide access to adjacent land and provide service to travel over relatively short distances.

MaineDOT collects pavement data on nearly 9,000 miles of this network, as detailed in the chart below. This data is used primarily to support the Department's Pavement Preservation Program. It focuses on major collectors and higher classifications of roadways, which also carry the majority of all traffic. As an example, arterial highways make up 12% of the network, yet they carry more than 60% of the traffic.

4.1 FFC and Urban/Rural Designation with VMT



Note: Interstate mileage includes northbound and southbound lanes of all interstates in Maine (I-95, I-295, I-395), but does not include Maine Turnpike Authority mileage or VMT.

4.0 Highways

4.2 Highway Adequacy

The HAI is an empirical evaluation of the health of a particular highway segment. The HAI is based on 3 basic elements of the roadway: condition, safety, and service. The HAI is a cumulative score on a scale from 0 to 100. The basic elements are listed in the following figure, with their respective point weighting.

4.2 Highway Adequacy Index

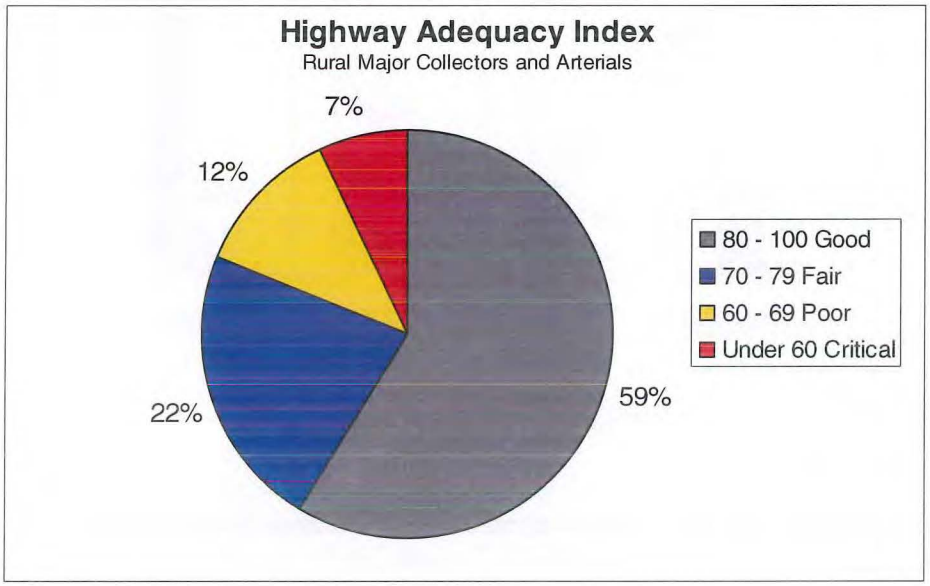
Sub Index	Arterials & Major Collectors Point weighting:
Condition Index	50
Safety Index	25
Service Index	25
Total	**100**

The resulting index evaluates the condition, safety, and the service provided to the users of a roadway segment. MaineDOT's intent is to utilize this index as a measure of the value of the highway system over time. A complete discussion of the individual factors, their origins, and the methodology for calculation can be found in the Highway Adequacy Report.

The Adequacy Index in its current form is relatively new with the initial calculations being completed in June 2005. The HAI is scheduled to include new data to better measure the sub-indices for the fall 2006 calculations. These include deficient horizontal curves, deficient vertical curves, stopping sight distance and passing sight distance. The improvements should greatly enhance both the Condition and Safety Indices.

The Adequacy Index on rural roadways depicted below indicates that 59% of the roadway mileage is considered "good" with an index of at least 80, while 7% of the highway mileage is considered to be "critical".

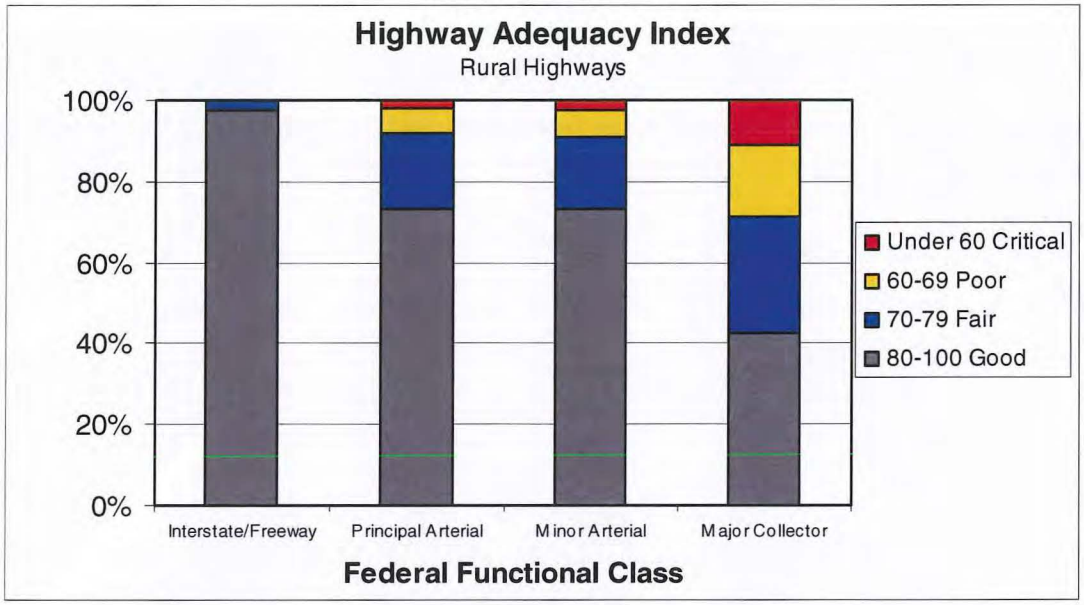
4.3 Highway Adequacy Index



4.0 Highways

Within each functional class there are significant differences in the distribution of highway adequacy ratings. The chart below illustrates these variations.

4.4 Highway Adequacy Index



The Interstate System has over 97% of its rural mileage rated "good". However, this system only comprises slightly over 9% of all rural highway mileage. Conversely, the Major Collector System has only 71% of its rural mileage rated "fair" or "good", while this system accounts for nearly 58% of the rural mileage. Nearly 90% of all critical mileage is on the Major Collector System.
It is evident that the scoring is currently weighted quite heavily towards the Condition Index which comprises 50% of the Adequacy Index. Thus it is likely not a coincidence that the percentages of highways rated "good" on the major collector system is very similar to the percentage of mileage that has been built. This apparent correlation leads to the conclusion that the best way to improve the overall highway adequacy of a section of highway is to build it to modern highway standards. This conclusion also leads to a very large need to build/rebuild a high percentage of that system. The Highway Adequacy Index will help the Department prioritize the sections which require a treatment.

4.3 Highway Conditions

The MaineDOT monitors the condition of approximately 9,000 miles of the State's public highway network. The monitoring program is performed on a two-year cycle using the Automatic Road Analyzer (ARAN) vehicle. The condition of highways in the Southern half of the state are collected on even numbered years, and the Northern half of the state is collected on odd numbered years. The Interstate System is collected annually.

4.3.1 Built vs. Unbuilt Roads

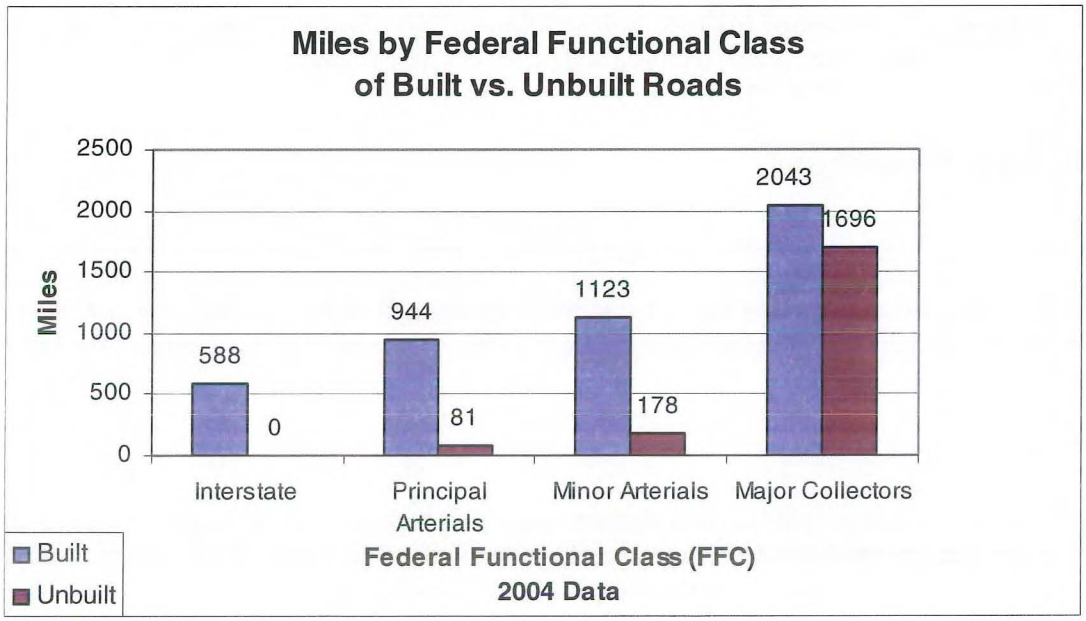
Maine's roadway system is split into two distinct categories: built and unbuilt roads. A built road is defined as one that has been constructed to a modern standard, usually post-1950. Modern standards include adequate drainage, base, and pavement to carry the traffic load, and adequate sight distance and width to meet current safety standards. An unbuilt road is defined as a roadway section that has not been

built to modern standards; it may have inadequate drainage, base, and pavement, sight distance and/or width.

A Built Road

This road has adequate lane width for the given traffic volume, paved shoulders, good sight distance, modern guardrail and curb to protect steep slopes, and good drainage features.

4.5 Miles by FFC of Built vs. Unbuilt Roads



An Unbuilt Road

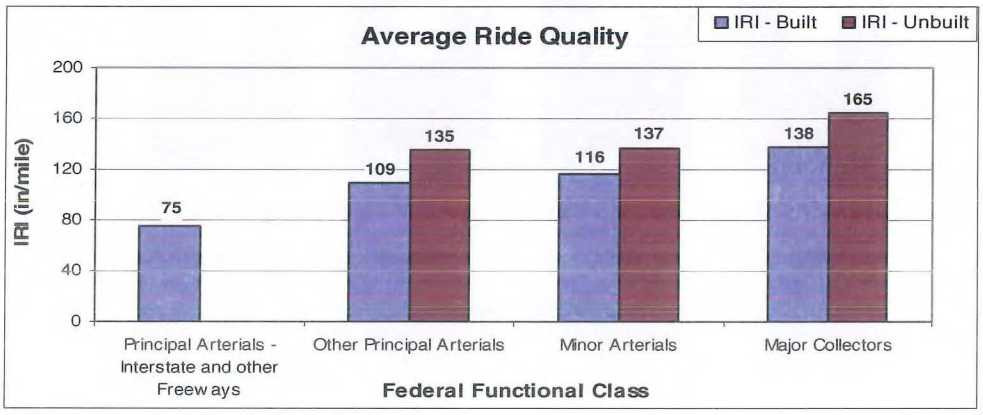
This road has narrow travel lanes, gravel shoulders, poor sight distance (as evidenced by the curve sign in the upper right hand corner), no guardrail protecting the slope to the lake on the left, and no ditches for drainage.

As more miles are improved to meet modern standards, these roads become part of the pavement preservation program that strives to cost effectively keep these roads in good condition.

4.3.2 Ride Quality (IRI)

Ride quality has been found to be a key indicator of customer satisfaction. Ride quality is expressed in terms of International Roughness Index (IRI) and is measured in inches of vertical displacement per mile. This is a measurement of the inches of vertical displacement experienced by a vehicle in a mile of roadway. The lower the IRI, the smoother the ride will be. According to the Federal Highway Administration (FHWA), an IRI of less than 170 in/mile is an acceptable ride.

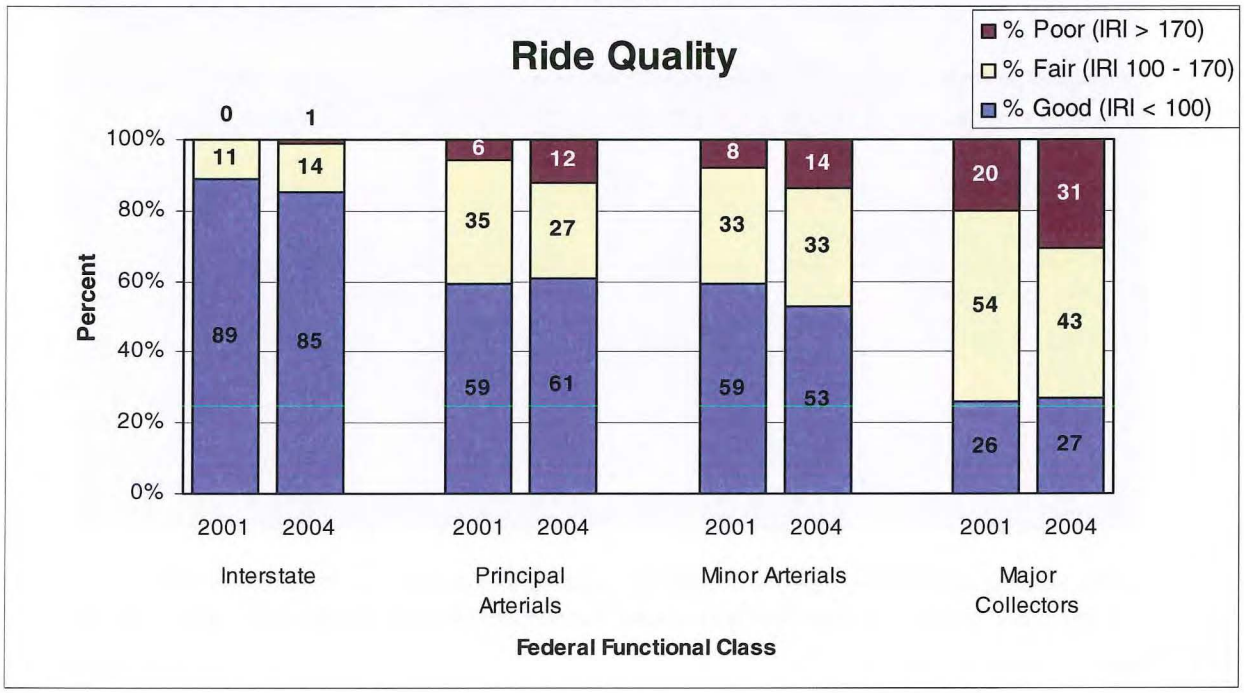
4.6 Average Ride Quality



4.0 Highways

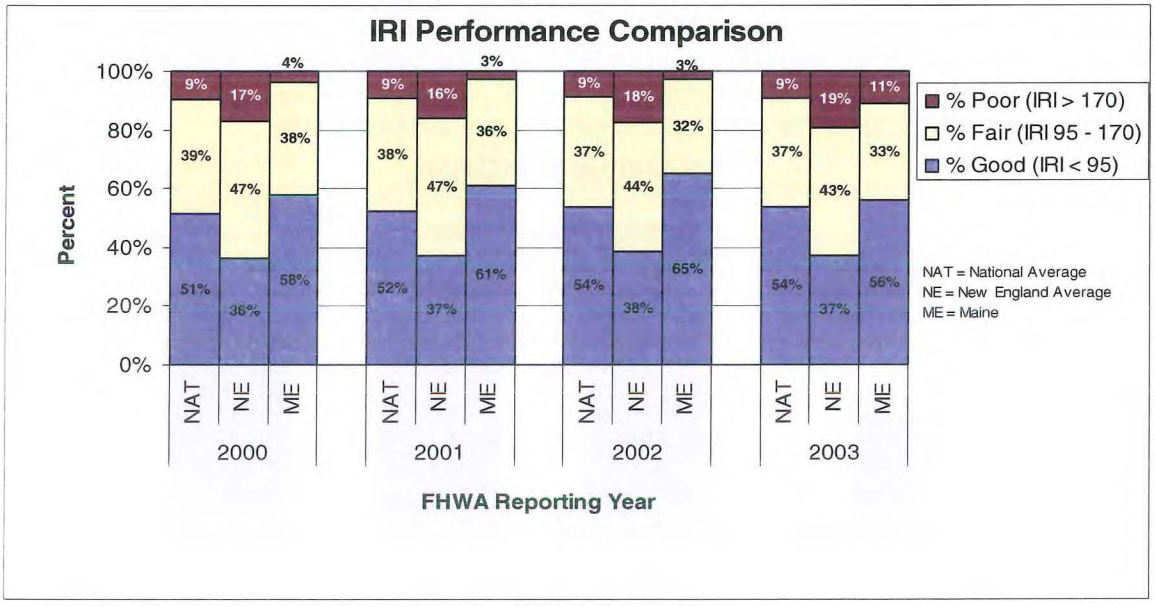
The majority of Maine's Roads measure an IRI value ranging from 50 in/mile to 400 in/mile. The following chart shows the percent of the roads by federal functional class that have a good, fair, and poor ride. For the purposes of this document, a good ride is defined as an IRI of less than 100 in/mile. A fair ride is defined as an IRI of 100-170 in/mile. A poor ride is defined as IRI greater than 170 in/mile.

4.7 Ride Quality



2004 Data based on 2003-2004 data of roads collected for pavement management purposes. 2001 Data as reported in the State of the System Report, November 2002.

4.8 IRI Performance Comparison

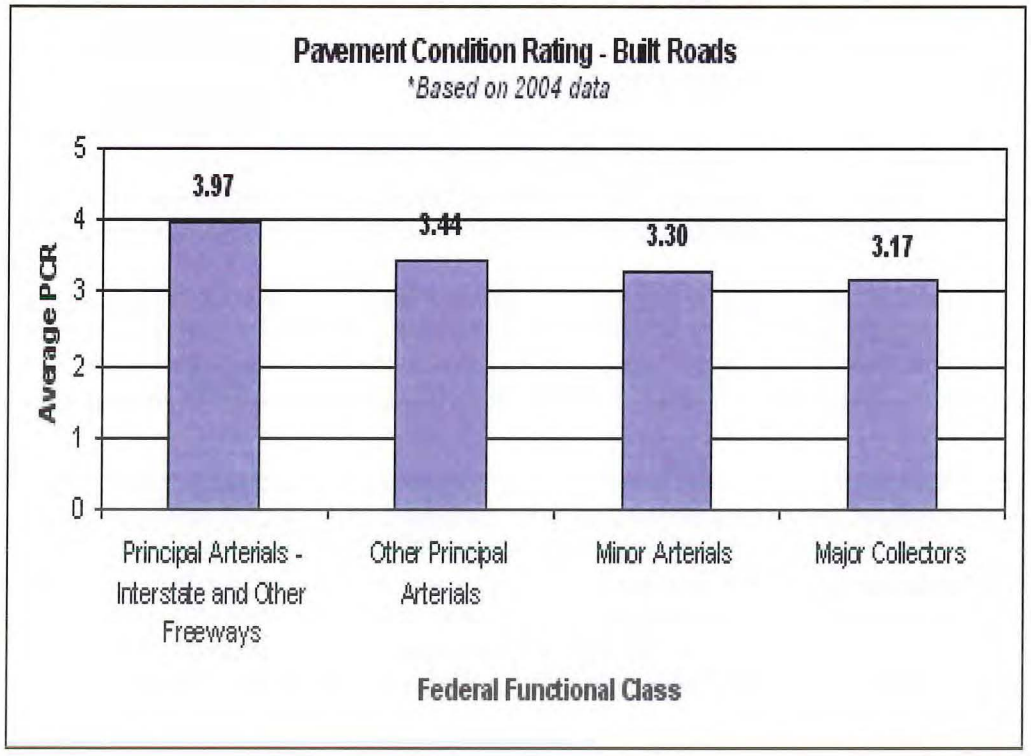


4.3.3 Pavement Condition Ratings (PCR) and Road Conditions

Pavement Condition Rating (PCR) is defined as the composite condition of the pavement on a roadway. The PCR is compiled from the severity and extent of pavement distresses such as cracking, rutting, and patching. The rating system uses a scale of 5.00 (perfect) to 0.00 (fully deteriorated). The PCR is the condition of the pavement only. It is not necessarily a reflection of the condition of the roadway base structure.

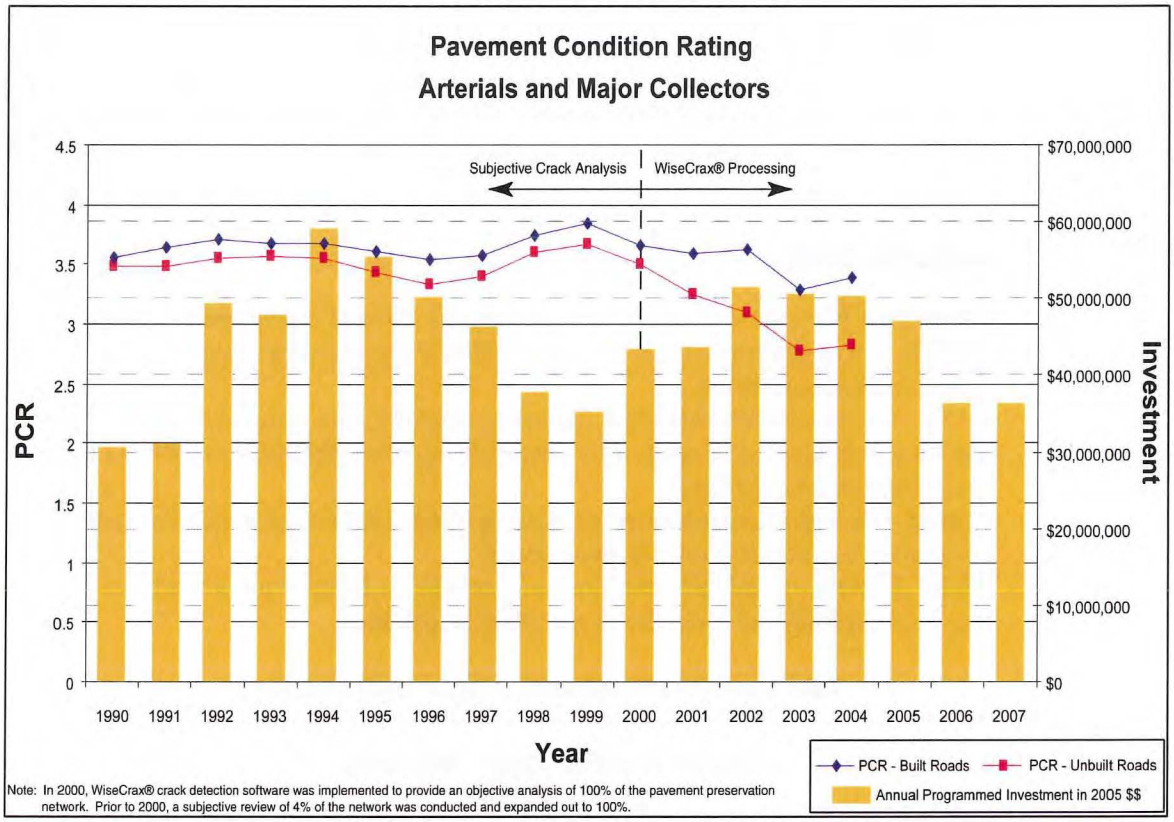
PCR	DESCRIPTION
5	**EXCELLENT** - New or nearly new pavements. Free of cracks, patches or rutting.
4	**GOOD** - Pavements exhibit little to no visible signs of surface deterioration. Evidence of initial cracking or rutting.
3	**FAIR** - Visible defects including moderate cracking, distortion and rutting. Some patching may now be present. *It is generally most cost effective to treat a road before the PCR drops below this level.*
2	**POOR** - Pavement deterioration consisting of advanced cracking and severe distortion. Extensive patching and rutting also present.
1	**VERY POOR** - Extremely deteriorated pavements. Defects include severe cracking, distortion, rutting and typically very extensive patching.

4.9 Pavement Condition Rating – Built Roads



The average pavement conditions network-wide remained relatively constant throughout the 1990's. There was a slight upward trend in PCRs from 1996-1997 through 1999-2000, but over the last 6 years the average PCR values have decreased. This deterioration of PCR is illustrated across all Federal Functional Classes, but is most noticeable in the minor arterial and major collector classes.

4.10 Pavement Condition Rating

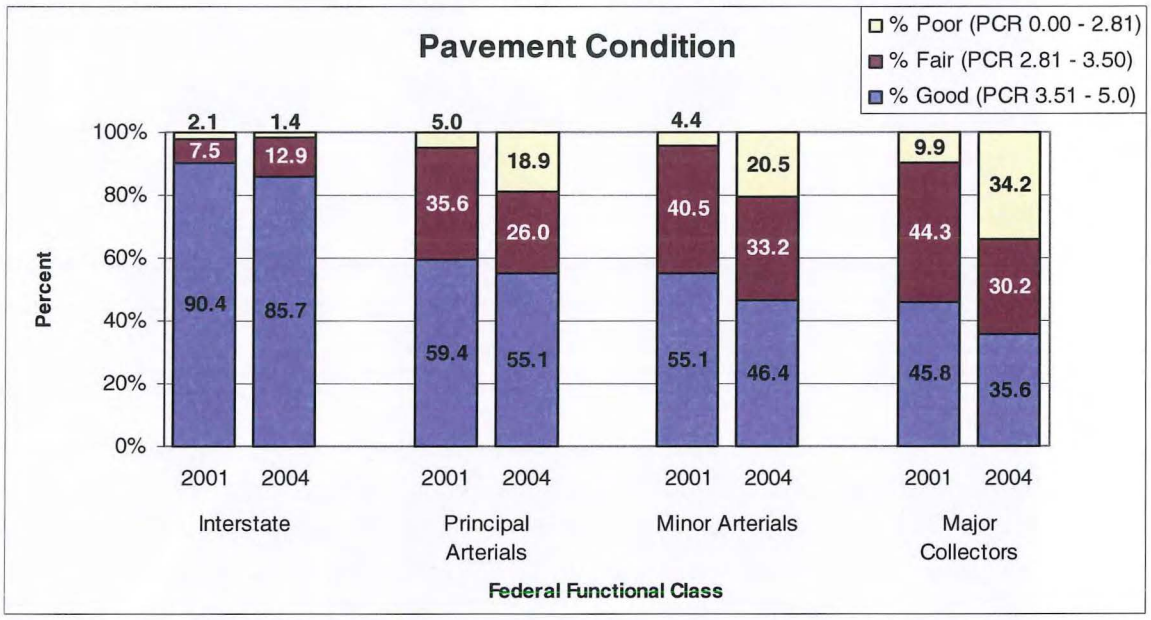


There are a number of likely reasons for this. It may be the result of several years of inconsistent funding of the pavement preservation program. This is illustrated in figure 4.10 which shows the annual programmed investment versus measured PCR for built and unbuilt arterials and major collectors.

Low and high network pavement condition ratings are seen approximately 4 to 5 years after lower and higher levels of funding respectively. Another factor that likely contributes to this decrease in average network condition is the increased cost of construction due to the volatility being experienced in the petroleum markets. This affects the cost of asphalt and fuel required to operate construction equipment.

The system of built roads is where the principles of pavement preservation are applied. MaineDOT's pavement management philosophy is to maintain the condition of the built system before expending resources to reconstruct the unbuilt portion of the system. This has proven to be a more cost effective method of maintaining the system than the concept of 'worst first', which would dictate fixing the worst roads in the system first, and not treating the 'better' roads. The philosophy of pavement management, sometimes called pavement preventive maintenance, is to maintain the condition of the built roads at good or very good condition, and to upgrade the unbuilt system as funding allows. Though many factors influence pavement deterioration, and are considered in the process, PCR is a key indicator on the built system to determine the optimum time to treat a particular section of road. It is generally most cost effective to treat a roadway before the PCR drops below a 3.0. More miles of roadway can be treated at a lower dollar cost per mile, thus maintaining the integrity of the system as a whole. MaineDOT's pavement management application, dTIMS CT, performs life-cycle cost analysis for a variety of treatment scenarios to help determine the right treatment at the right time with the highest return on investment. The following graph shows the condition of the State's highway network as a percentage of good, fair, or poor condition.

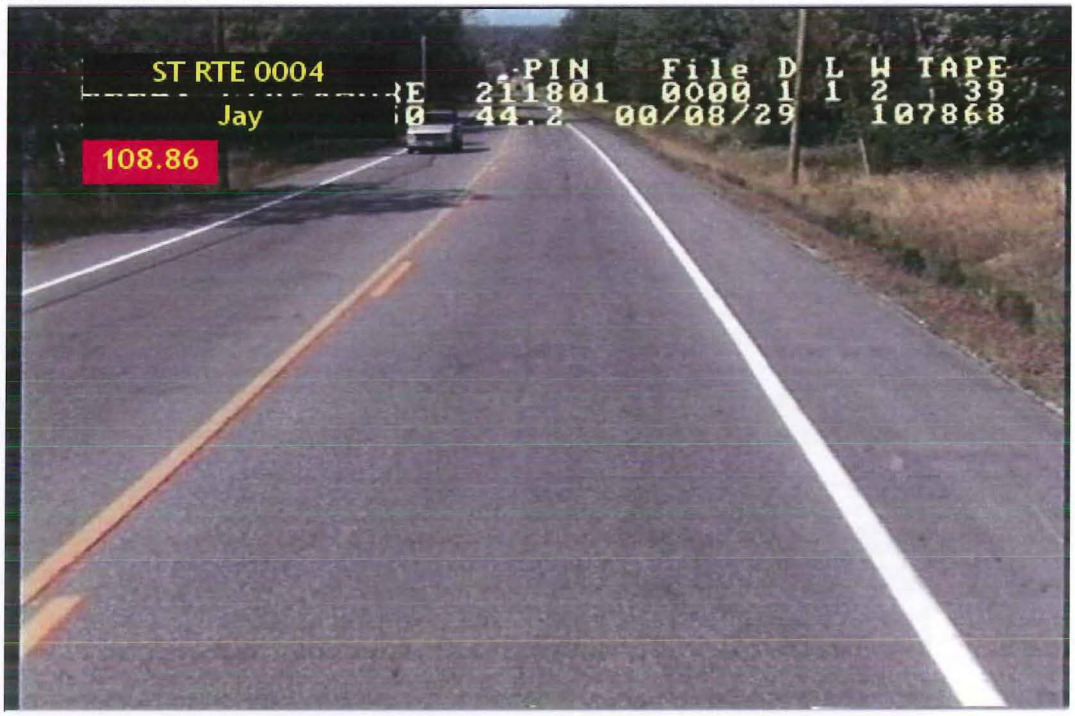
4.11 Pavement Condition



2004 Data based on 2003-2004 data of roads collected for pavement management purposes. 2001 Data as reported in the State of the System Report, November 2002.

The following images depict examples of Good, Fair and Poor pavements:

Good = PCR 3.51 - 5.0



4.0 Highways

Fair = PCR 2.81 - 3.50

Poor = PCR 0.0 - 2.80

4.3.4 Posted Roads:

MaineDOT has the right and responsibility to limit the weight of trucks and vehicles operating on State and State Aid Highways per Title 29-A, Maine Revised Statutes Annotated, in order to protect roads from potential damage. Posting of roads typically occurs in late winter/early spring when the temperature regularly goes above freezing and the roadways start to thaw. Many unbuilt roads with good free draining gravel material as a roadway base and that are showing signs of distress, are posted with a weight limit to prevent further damage from heavy vehicles. These roads are posted to prevent vehicles with a registered weight over 23,000 pounds from hauling over them when the vehicles are loaded and the roadway is not frozen. If the air temperature is 32 degrees Fahrenheit, or less with no visible water on the roadway, then trucks over 23,000 pounds are allowed to haul their loads over the roadway. Passenger cars, pickup trucks and emergency vehicles are exempt from these regulations. Any vehicle transporting home heating fuel (oil, gas, coal, stove size wood) to a private consumer, gasoline, groceries, bulk milk, bulk feed, solid waste, rubbish or medical gases may apply for an exemption certificate. These vehicles must be registered when in excess of 23,000 pounds and must be carrying a partial load with a weight equal to or less than that indicated on an exemption certificate issued by the MaineDOT. The impact of posted roads on the State's economy is significant, affecting commercial and industrial interests throughout the state. The following figure lists the centerline miles of posted roads per region in the spring of 2005 by Federal Functional Classification.

4.12 Centerline Miles of Posted Roads

REGION	MINOR COLLECTOR	MAJOR COLLECTOR	MINOR ARTERIAL	PRINCIPAL ARTERIAL
SOUTHERN	6		8	
MID COAST	37	20		
WESTERN	293	428		
EASTERN	483	232	8	
NORTHERN	283	56		
TOTALS	1102	736	16	

To remedy the need to post roads would require rebuilding the roadway base and pavement structure. A rough estimate to accomplish this rebuild of 1854 miles of posted roads would be approximately $600,000 per centerline mile of roadway or $1,112,400,000 to improve all roads typically posted in the spring.

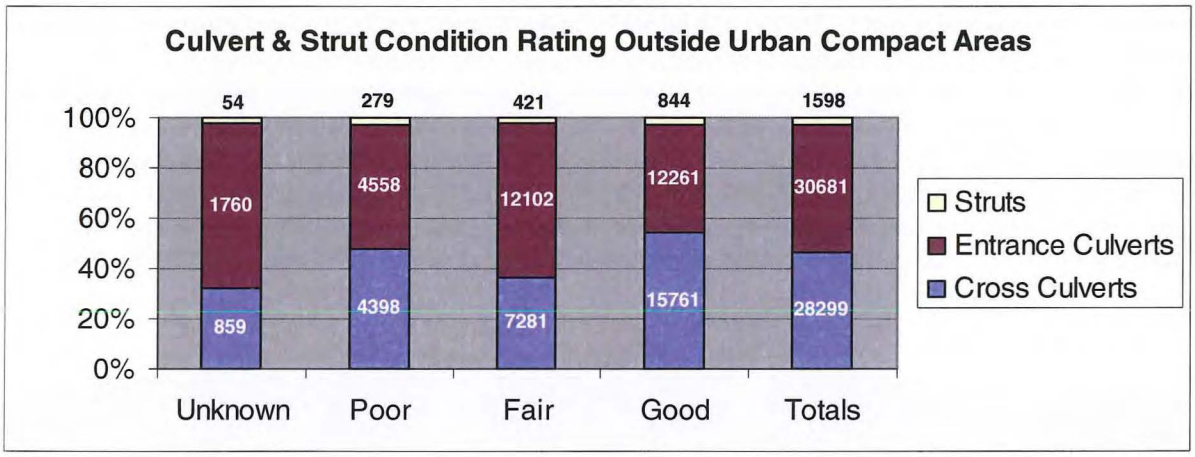
4.3.5 Roadway Attributes:

The Department is currently utilizing and further developing an asset management tool called the Asset Inventory Management System (AIMS). AIMS is a database of roadway attributes and currently contains a description of the asset as well as the location and condition data for each individual cross culvert, entrance culvert, strut (generally a pipe between 5 feet and 10 feet in diameter), guardrail, catch basins, Department owned property & buildings and major & minor signs that are the MaineDOT's responsibility throughout the state. Information regarding the Maintenance Crew that is responsible for each asset is also included. The purpose of the tool is to help monitor the condition of the various roadway attributes and to plan for required work or repairs on these attributes. From this database we can pull the information regarding the total number of the various attributes as well as the general condition to help determine an approximate need to bring them up to a "good" condition rating. On the following is a figure outlining the total number of the various roadway attributes.

4.13 Number of the Various Roadway Attributes

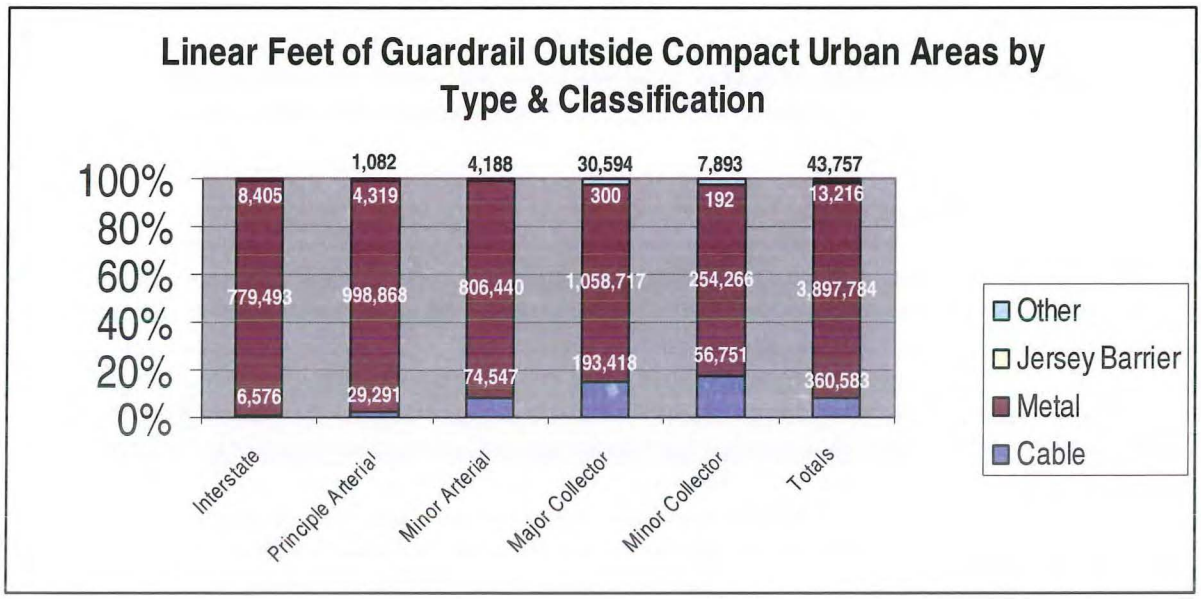
ROADWAY ATTRIBUTE	TOTAL OUTSIDE URBAN COMPACT AREAS
Cross Culverts	27,459
Entrance Culverts	28,400
Struts	1,590
Guardrail	4,315,340 Linear Feet

4.14 Attribute Condition Chart 1



A rough estimate to bring all fair and poor culverts up to a good condition rating would be approximately $1,200 per culvert for 27,459 culverts or approximately $27,776,400 to bring these culverts outside the Urban Compact Areas up to good condition.

4.15 Attribute Condition Chart 2



4.4 Highway Use

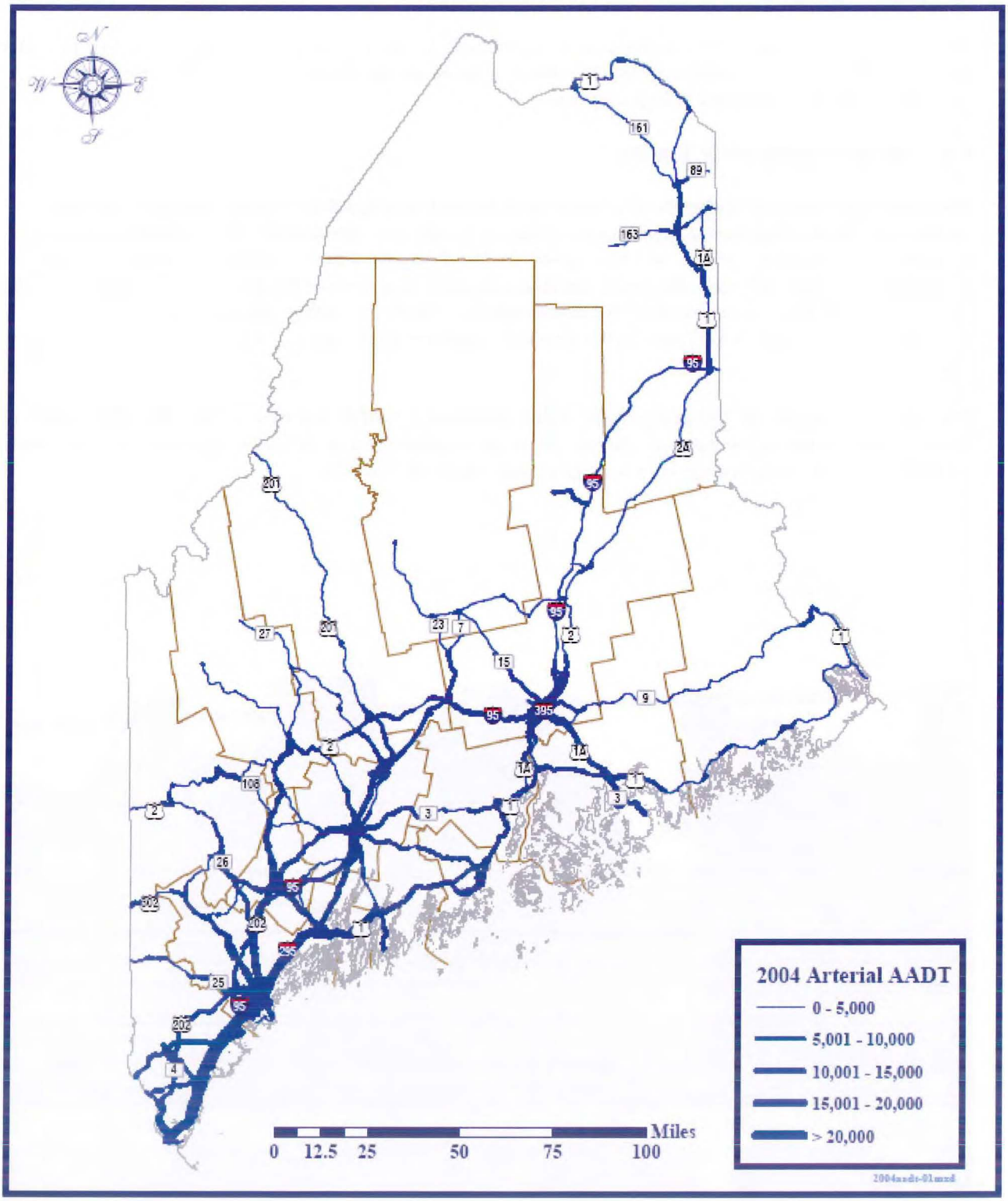
Measurements of the use of the highway system are an indication of the demands that are being placed on the system by its users: people who need to travel or move goods across the state. The following describes some key measures of highway use.

4.4.1 Annual Average Daily Traffic

The most basic measure of the use of a highway is Annual Average Daily Traffic (AADT), the total number of vehicles that pass a location on a roadway in one year, divided by 365. Estimates of AADT are used in the planning, design, and management of highway facilities. AADT is the measure used to track historic traffic growth and forecast future traffic growth at specific locations on the highway system. AADT is an important component of the measurements of highway safety and mobility performance. Existing and forecasted AADT also helps determine appropriate design standards for highways and bridges.

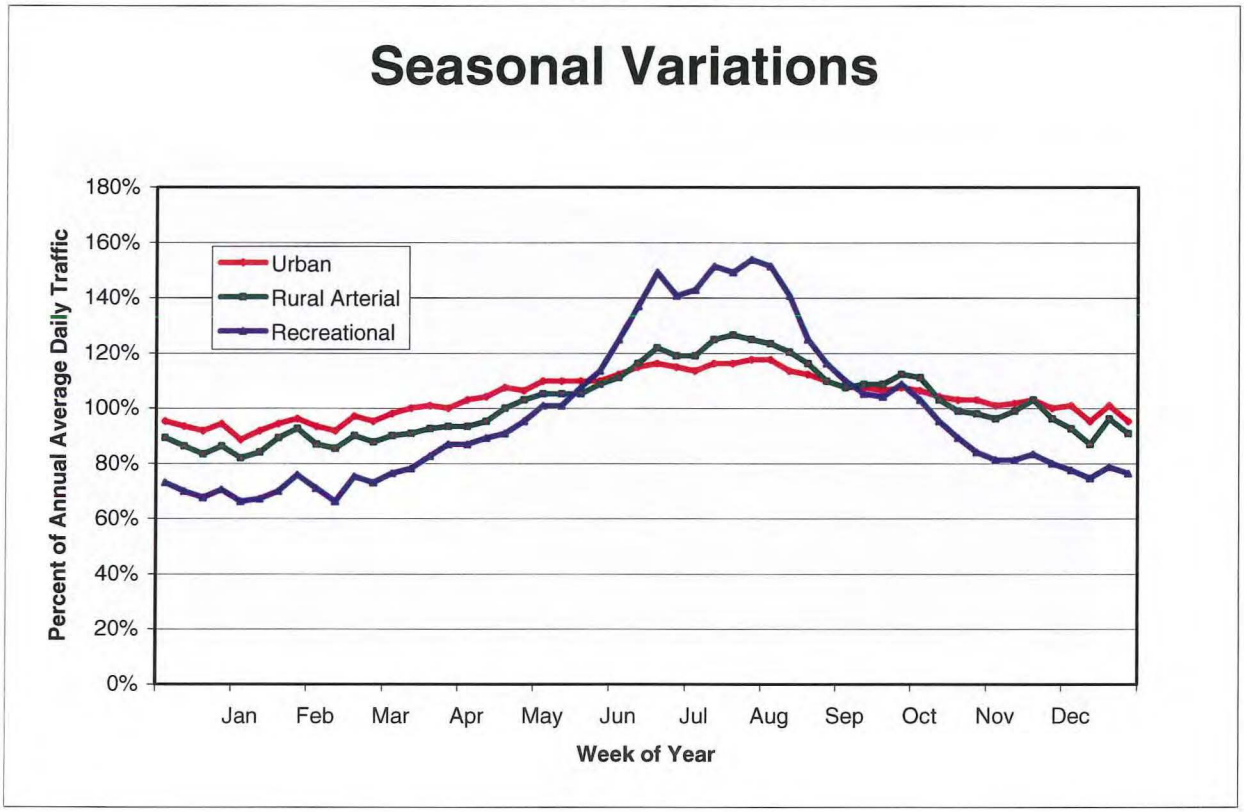
The statewide map in the following figure shows the relative AADT volumes on the arterial highways in Maine. Most of the higher volume arterials are in the southern half of the state. Interstate 95 and other arterials across the state are the backbone of Maine's highway network.

4.16 Statewide AADT



While AADT represents an annual average, daily traffic varies seasonally throughout the year. Figure 4.14 shows how traffic levels change from month to month based on highway type. These patterns show higher traffic volumes in the summer months and lower volumes in the winter months. The strongest pattern change is shown for highways with recreational traffic heavily affected by the summer peak in tourism. The most uniform pattern exists in urban locations and many suburban areas, which are dominated by commuting and other local traffic. The intermediate pattern change is typical of many rural arterial highways, which have a balanced mix of tourism and year-round traffic.

4.17 Seasonal Variation in Traffic



4.4.2 Vehicle-Miles Traveled

Vehicle-Miles Traveled (VMT) is the principal measure of the overall use of the highway system. In the year 2004, statewide VMT was nearly 15 billion vehicle-miles. As an overall measure of use of the highway system, VMT is useful in tracking growth in highway travel, which affects overall system condition, performance, fuel use and air quality.

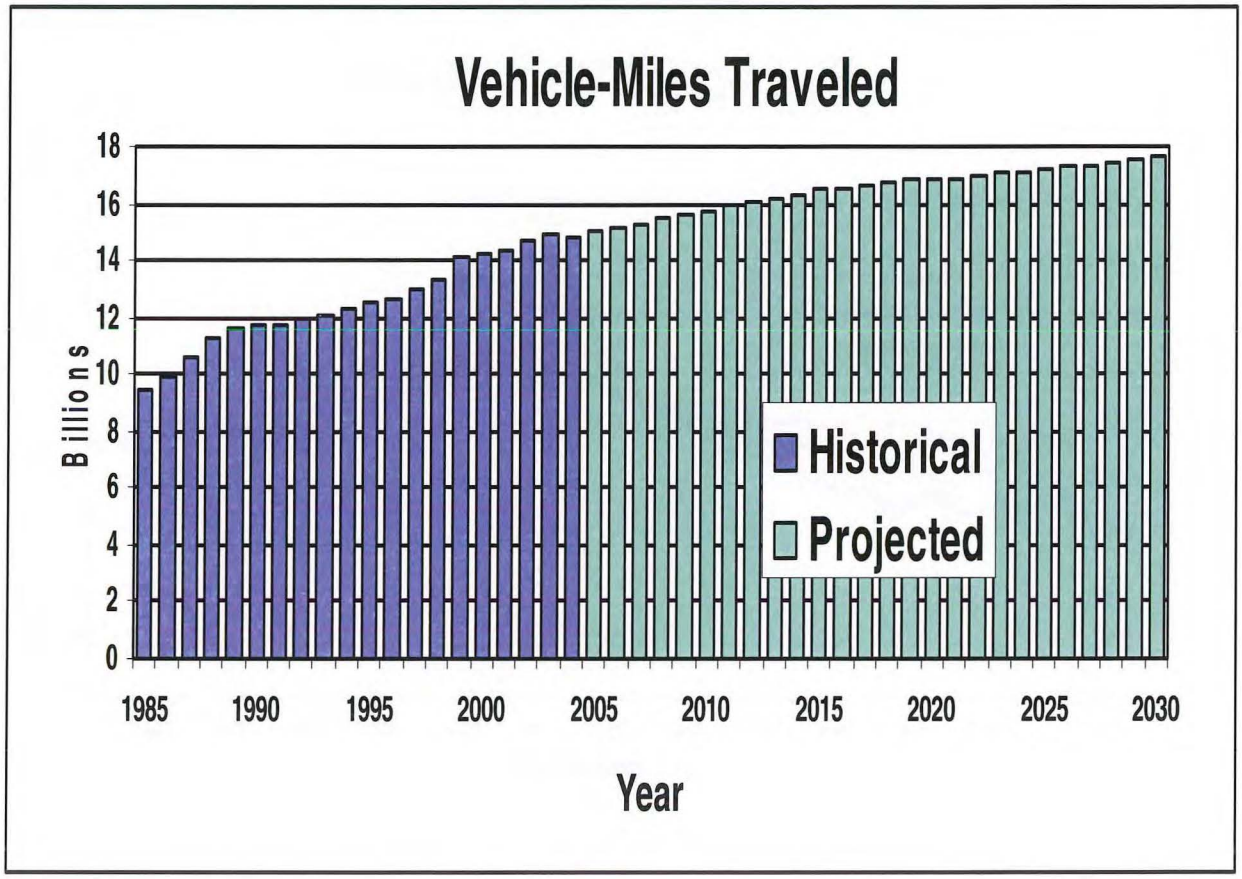
Figure 4.18 shows how statewide VMT has been growing through the years, with periods of slow and more rapid growth. Continued growth in VMT is expected in the foreseeable future, but it may occur at a slower pace than historic trends.

A further breakdown of statewide VMT in 2004 is shown in figure 4.19. Light vehicles, which include passenger cars, light trucks, and motorcycles, account for approximately 93% of the VMT on the highway system. Tractor-trailers and single-unit heavy trucks, about 7% of the VMT overall, are over 10% of the traffic on the Interstate highways. Arterials (principal and minor) carry 61% of the VMT.

4.0 Highways

Travel in rural areas accounts for 74% of the VMT. This high percentage of VMT can be attributed to the fact that Maine has a substantial rural population and that the low population density of rural areas means traffic generated in rural areas must travel greater distances than traffic generated in urban areas. Long-distance travel, whether generated in urban or rural areas, passes through mostly rural areas.

4.18 Trends in Statewide VMT



4.19 2004 VMT by Vehicle Type and Federal Functional Class

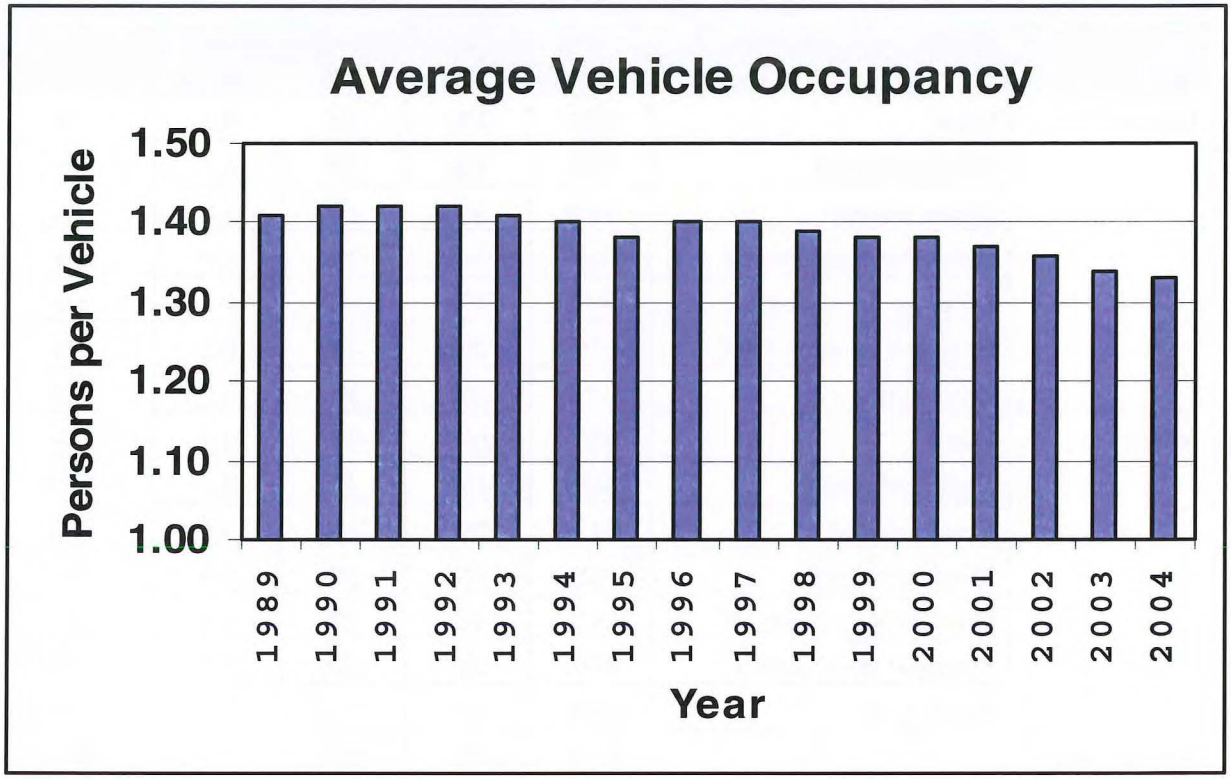
Area Type	Federal Functional Class	Light Vehicle	Single Unit Truck	Tractor-Trailer	VMT (billion)	Percent of Grand Total
Urban	Local	96%	4%	0%	0.3	2%
	Urban collector	95%	4%	2%	0.7	5%
	Minor arterial	95%	3%	2%	1.0	7%
	Other Principal arterial	95%	3%	2%	1.0	6%
	Principal art interstate	90%	4%	6%	0.7	5%
	Principal art other F&E	93%	3%	4%	0.2	1%
	Urban Total	94%	3%	3%	3.9	26%
Rural	Local	94%	6%	0%	1.3	9%
	Major collector	96%	2%	2%	2.5	17%
	Minor arterial	91%	5%	4%	1.9	13%
	Minor collector	92%	5%	3%	0.9	6%
	Other Principal arterial	91%	4%	5%	2.0	13%
	Principal art interstate	89%	5%	6%	2.5	17%
	Rural Total	92%	5%	3%	11.1	74%
Grand Total		**93%**	**4%**	**3%**	**15.0**	**100%**

4.4.3 Average Vehicle Occupancy

Average Vehicle Occupancy (AVO) is the average number of occupants (driver and passengers) in vehicles on the highway. This indicator is used to convert vehicle-based measures, such as VMT, to person-based measures, such as Person-Miles Traveled (PMT). AVO is estimated from data compiled in thousands of crash records each year.

The trend shown in figure 4.20 indicates how the statewide AVO has been slowly decreasing. This slow decrease may be the result of dispersed patterns of land development, reduced household size, reduced carpooling, and increased levels of auto ownership.

4.20 Trend in Average Vehicle Occupancy



4.5 Mobility

Mobility is the ability of people and goods to move from one place to another. The arterials in the highway system provide most of the mobility in Maine. While only representing 12% of the road mileage, arterials account for more than 60% of VMT statewide. For this reason, the performance of the arterials, in serving the mobility needs of the state, is an important part of the system evaluation. The following describes key indicators of highway mobility and performance.

4.5.1 Posted Speed

The speed limit (posted speed) of a highway is an important indicator of the facility's potential to provide mobility. Roads with higher posted speeds can serve the movement of people and goods more efficiently than low-speed roads.

Interstate highways, other principal arterials, and minor arterials account for more than 3,000 miles of Maine's road network. Figure 3.21 shows a percentage breakdown of arterial mileage by posted speed. Half of Maine's arterial mileage is posted at 55 mph or higher.

4.21 Arterial Mileage by Posted Speed

Posted Speed	Mileage	Percentage
65	727	23%
60	0	0%
55	883	28%
50	593	19%
45	282	9%
40	139	4%
35	214	7%
30	110	3%
25	210	7%
Total	**3157**	**100%**

Posted speeds vary by functional class and area type. Higher functional classes tend to have higher posted speeds. Also, roads in rural areas generally have higher posted speeds than in urban areas. Figure 4.22 shows the average posted speed of urban and rural functional classes of arterials, weighted by mileage in each class. With posted speeds that are generally 65 mph, rural Interstate highways provide the highest level of highway mobility in Maine. At the other extreme, minor arterials in urban areas have an average posted speed around 30 mph.

4.22 Average Posted Speed by Functional Class

Functional Class	Average Posted Speed	
	Urban	Rural
Interstate & Expressway	52.9	64.1
Other Principal Arterial	32.6	47.2
Minor Arterial	30.6	45.6

4.5.2 Utilization of Capacity

In addition to posted speed, AADT and hourly highway capacity (C) are important factors in the measurement of mobility. While AADT is a measure of use, C is the maximum number of vehicles that can pass by a location in a single hour. When AADT is divided by C, the AADT/C ratio measures how intensely a highway is utilized. If traffic volumes increase over time but the capacity remains the same, the AADT/C also increases. As a highway facility's AADT/C ratio increases, the average speed of vehicles on that facility tends to decrease. This decrease in average speed provides evidence of reduced mobility.

Figure 4.23 shows a breakdown of arterial mileage by area type and by ranges of AADT/C, based on volume data for the year 2004. About 75% of all arterials are in the low and very low ranges of AADT/C, where the traffic-carrying capacity of the roadway is never challenged. Less than 3% of the mileage is in the high or very high ranges where capacity is routinely reached. Most urban mileage is in the low, moderate, or moderately high ranges of AADT/C. The majority of rural mileage is in the low or very low ranges.

4.23 Arterial Mileage in 2004 by AADT/C Range

Range of AADT/C	Operates at Capacity(Typ.)	Urban	Rural	Total	Percentage
Very Low (0-2)	never	63	1,256	1,319	42.0%
Low (2-4)	never	152	895	1,047	33.3%
Moderate (4-6)	rarely in peak hours	172	281	454	14.5%
Moderately High (6-8)	seasonally in peak hours	121	110	231	7.4%
High (8-10)	routinely in peak hours	44	30	74	2.3%
Very High (> 10)	for prolonged peak periods	14	1	15	0.5%

Figure 4.24 shows the average AADT/C ratios for functional classes of urban and rural arterials. As indicated, the arterials in urban areas are more heavily utilized than rural arterials. Among the functional classes, Interstate and expressway mileage has lower utilization of capacity than other arterial classes, mainly due to their ability to carry relatively large numbers of vehicles (close to 2,000 vehicles/lane/hour). This high capacity is made possible by multiple lanes, full control of access, and a median to separate the two directions of traffic flow. Other principal arterials, with their high transportation importance and lower capacity (often less than 1,000 vehicles/lane/hour), have the heaviest utilization of capacity.

4.24 Average AADT/C by Functional Class

Functional Class	Average AADT/C	
	Urban	Rural
Interstate & Expressway	3.82	2.93
Other Principal Arterial	5.61	2.92
Minor Arterial	5.62	2.37

4.0 Highways

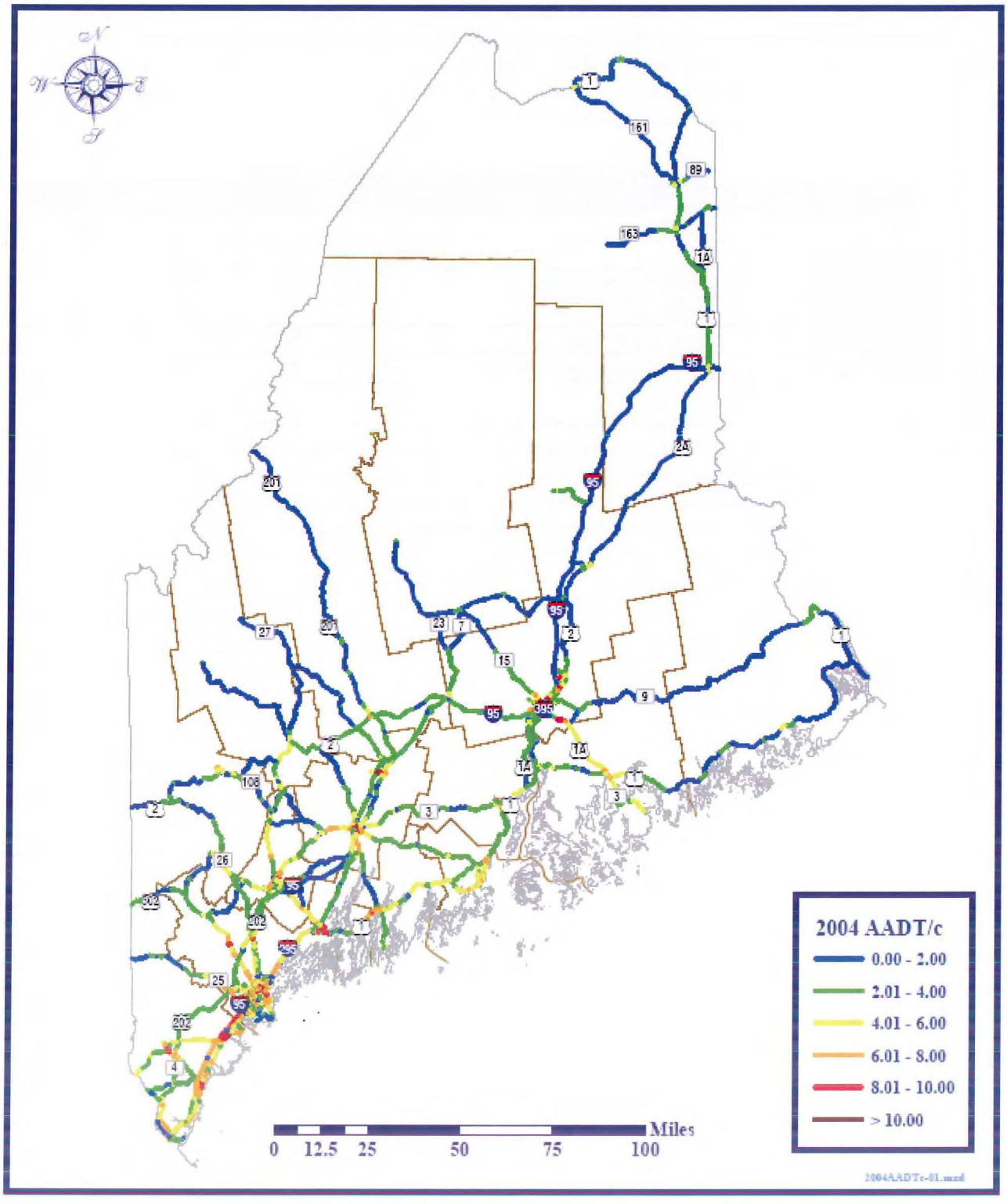
As traffic volumes increase between years 2004 and 2030, average AADT/C ratios can be expected to increase by about 20%. Figure 4.40 shows the projected breakdown of arterial mileage by AADT/C range in 2030 if no changes are made to the arterial network. A comparison of figure 4.40 with figure 4.25 shows the likely shift to the higher ranges of AADT/C. The amount of arterial mileage in the very high range could increase more than fourfold, from 15 to 70 miles. Mileage in the high range could nearly double, going from 74 miles to 135 miles. At the other end of the spectrum, mileage in the low and very low ranges could decrease by about 250 miles.

4.25 Arterial Mileage in 2030 by AADT/C Range

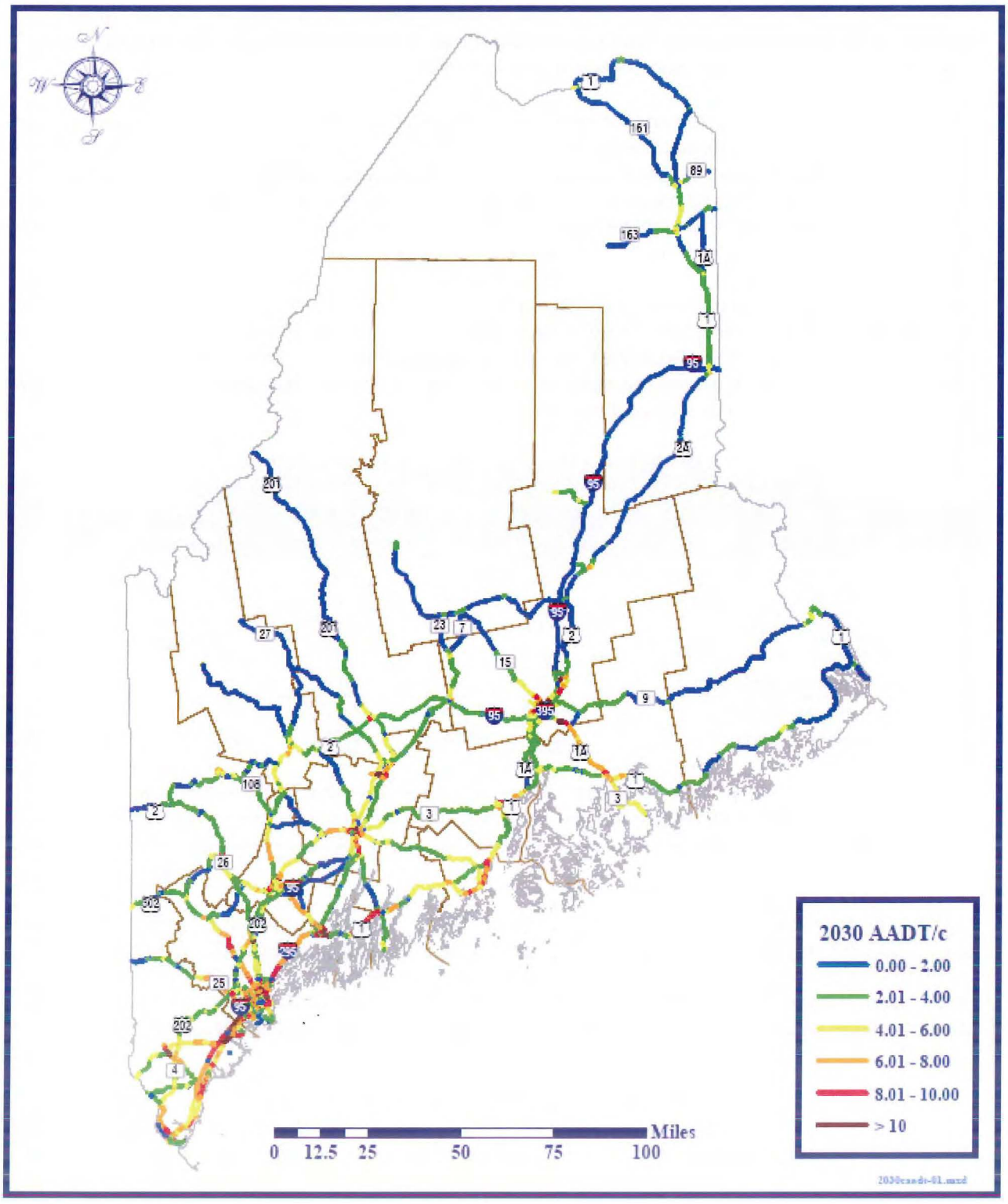
Range of AADT/C	Operates at Capacity (Typ.)	Urban	Rural	Total	Percentage
Very Low (0-2)	never	41	1072	1113	36%
Low (2-4)	never	119	876	995	32%
Moderate (4-6)	rarely in peak hours	146	374	520	17%
Moderately High (6-8)	seasonally in peak hours	141	159	301	10%
High (8-10)	routinely in peak hours	72	62	134	4%
Very High (> 10)	for prolonged peak periods	46	24	70	2%

The potential increase in the utilization of arterial capacity could lead to more arterial miles being pushed to the limits of their capacity more often. These strains on capacity would lead to increased levels of traffic congestion on arterials in the future. Figures 4.26 and 4.27 shows the capacity utilization of the Maine arterial network in 2004 and the potential utilization by 2030, respectively. The increasing demands on capacity are evidenced by the spread of the red and orange levels of utilization on arterials in the southern and central regions of the state, an indication that additional highway capacity will be needed in the future.

4.26 AADT/C on Arterials
2004



4.27 AADT/C on Arterials in 2030



4.5.3 System Efficiency - VHT and Delay

While vehicle-miles traveled (VMT) is an overall measure of travel on the highway system, an overall measure of the amount time spent traveling is vehicle-hours traveled (VHT). Because time has value, evaluation of VHT allows the estimation of travel time costs and benefits.

Ideally, travel would be free flowing for all travelers. However, on our arterial network, the presence of many travelers creates interference in the free flow of traffic. As a result, travel speeds decline and travel times increase. The increase in travel time caused by the interference among vehicles is called delay, which can be considered as the excess travel time due to traffic interference (congestion). Delay is an added cost to the traveler. If actions are taken to reduce delay in the highway network, these reductions in delay are considered to be mobility benefits of the actions.

An indicator of the congestion level of a highway facility is the travel time ratio. This ratio equals total VHT divided by the free flow VHT (VHT with no delay). A travel time ratio of 1.25 indicates that delay increases travel time by 25%. Total VHT, travel time ratios and delay are shown for various arterial classes in figure 4.428. Also shown in figure 4.43 are total VHT, delay, and delay costs broken down by arterial class. Urban arterials account for most of the delay costs.

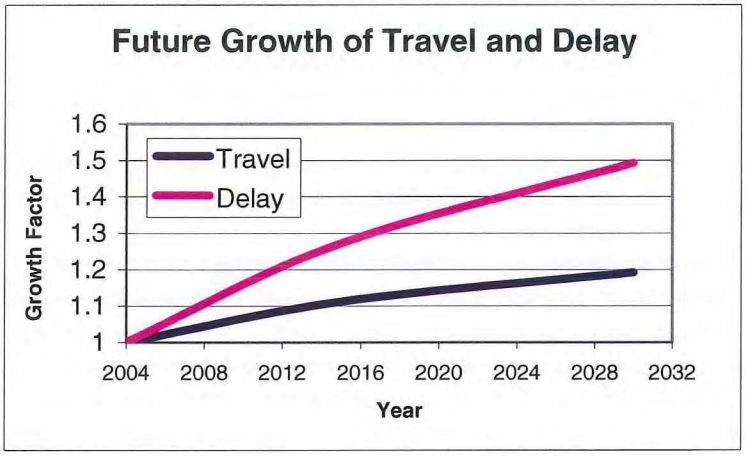
4.28 VHT and Delay in 2004 by Functional Class

Area Type	Functional Class	Total VHT (millions)	% of VHT	Travel Time Ratio	Delay VHT (millions)	Delay Costs ($millions)	% of Delay
Urban	Interstate & Expressway	12.9	5%	1.04	0.5	6	1%
	Other Principal Arterial	35.5	16%	1.49	11.7	131	30%
	Minor Arterial	43.1	20%	1.54	15.0	164	38%
Rural	Interstate & Expressway	39.0	18%	1.03	1.2	17	4%
	Other Principal Arterial	44.8	20%	1.14	5.6	65	15%
	Minor Arterial	42.7	19%	1.12	4.6	54	12%
Combined Total		**219.4**	**100%**	**1.21**	**38.7**	**438**	**100%**

Overall, it is estimated that delay on Maine's arterials in 2004 exceeded 38 million vehicle-hours, with delay cost of more than $400 million dollars. Although rural arterials have more VHT, most of the delay occurs on urban non-Interstate arterials where capacity is limited, traffic volumes are high, and land use access is generally uncontrolled.

Figure 4.29 shows the effect of future travel growth in delay in the arterial network (with no mobility improvements). As the future trends show, the growth in delay, measured in VHT, far exceeds the growth in travel, measured in vehicle-miles (VMT). Between 2004 and 2030, delay is expected to grow at two and a half times the rate of growth in travel. When the growth of delay exceeds the growth in travel, the traveler experiences higher levels of congestion and reduced travel efficiency.

4.29 Future growth of travel delay



To moderate the growth of delay, actions must be taken to reduce VMT growth, improve control of access on arterials, and/or increase future capacity in the arterial network. If these actions are successful in holding the growth in delay to the same rate as the growth in travel, then current levels of congestion and mobility experienced by the traveler can be maintained.

4.6 Highway Funding Scenarios And Implications

For highway conditions, the Department's highway expenditures are broken up into three distinct categories: Highway Improvements, Pavement Preservation, and Maintenance Surface Treatment.

- Highway Improvement Projects are generally those projects done on an unbuilt (backlog) roadway in order to improve the condition of the road to meet current standards (adequate sight distance, drainage, safety, and structural capacity).
- Pavement Preservation treatments are applied to built roads to cost effectively keep good roads in good condition. MaineDOT maintains a set of tools that assist planners and designers in optimizing the effectiveness of pavement expenditures. The function of Pavement Management is to collect and analyze pavement condition data to improve the efficiency of decision-making and provide feedback on the consequences of decisions. This is accomplished by providing timely recommendations on treatment alternatives and locations, to protect the current investment in highways and to reduce user costs.
- Maintenance Surface Treatment, sometimes referred to as maintenance paving, is defined as paving that is done on unbuilt, or inadequate highways to keep those roads in a serviceable condition until such time as a more substantial treatment can be done. Maintenance paving does not generally address issues of drainage, sight distance, or structural adequacy.

4.30 Summary of Highway Investments by BTIP

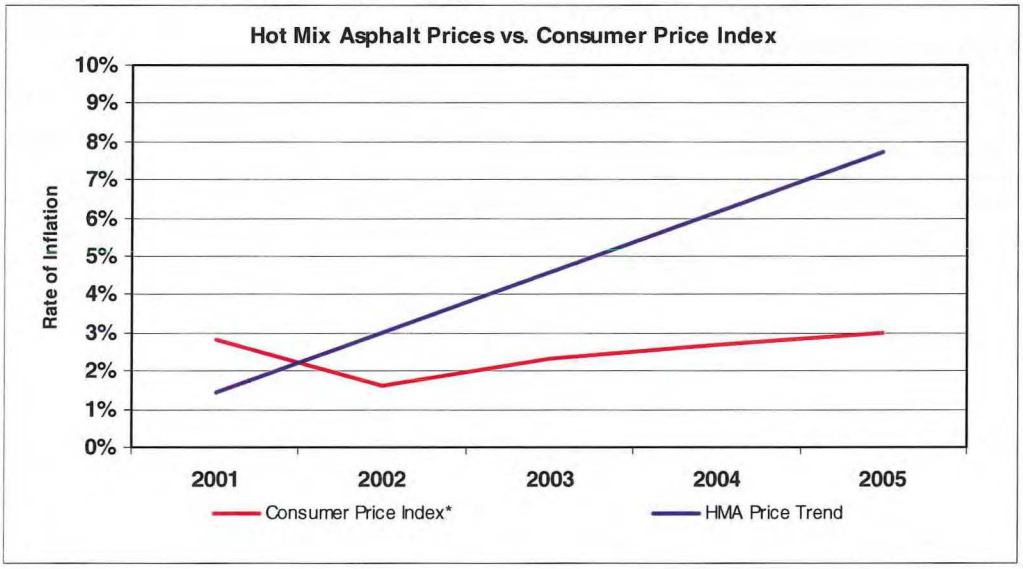
(Cost in Millions of 2005 Dollars)										
	1998-1999 BTIP		**2000-2001 BTIP**		**2002-2003 BTIP**		**2004-2005 BTIP**		**2006-2007 BTIP**	
	Miles	**Cost**	**Miles**	**Cost**	**Miles**	**Cost**	**Miles**	**Cost**	**Miles**	**Cost**
Highway Improvements										
Principal Arterial	30.8	$57.1	22.9	$38.8	28.1	$43.3	46.1	$38.7	31.9	$39.0
Minor Arterial	39.4	$36.5	20.2	$25.6	27.5	$32.3	64.7	$36.4	42.5	$45.4
Major Collector	36.4	$25.1	101.4	$50.4	110.8	$77.4	91.3	$51.0	183.2	$53.7
Minor Collector	39.1	$15.8	25.4	$5.0	55.1	$19.7	30.7	$9.5	42.8	$9.6
Total Improvement	**145.7**	**$134.5**	**169.9**	**$119.8**	**221.5**	**$172.7**	**232.8**	**$135.6**	**300.4**	**$147.7**
Pavement Preservation										
Interstate	86.0	$18.0	64.0	$14.2	44.6	$10.8	103.4	$17.2	96.0	$15.7
Principal Arterial	67.0	$18.4	119.0	$24.9	80.9	$23.0	136.4	$22.6	146.6	$24.0
Minor Arterial	123.0	$20.3	137.0	$26.0	139.5	$35.4	154.7	$25.6	120.0	$19.5
Major Collector	184.0	$15.9	149.0	$21.9	135.9	$32.8	190.9	$31.6	64.0	$10.4
Total Resurfacing	**460.0**	**$72.6**	**469.0**	**$87.0**	**400.9**	**$102.0**	**585.4**	**$97.0**	**426.6**	**$69.6**
Maintenance Surface Treatment (MST)										
Total MST	**1401**	**$20.7**	**1436**	**$16.8**	**1296**	**$22.8**	**1450**	**$30.3**	**1230**	**$28.2**

4.0 Highways

4.6.1 The Effects of Future Funding Levels and Inflation on Overall Network Condition

The Department recognizes the importance of accurately predicting the proper amount to spend on each of these treatment methods. We are working towards even more efficient pavement preventive maintenance, striving to do the right thing in the right place at the right time to maximize our return on investment. It is important to note, however, that the cost of construction materials has significantly outpaced the standard rate of inflation due in large part to increased asphalt and fuel costs. The following graph shows the upward trend of the average price per ton of hot mix asphalt (HMA) over the past 6 years compared to the Consumer Price Index (CPI).

4.31 Hot Mix Asphalt Prices vs. Consumer Price index



The decrease of 220 miles paved with Maintenance Surface Treatment between the 2004-05 BTIP and 2006-07 BTIP in table 4.30 is likely due in large part to the sharp increase in construction costs due to increased asphalt prices. In recent years, maintenance paving funds have also been used to do pavement preservation type treatments (STATE PPM) on built major collectors. This has proven to be a cost-effective means to extend the life of built major collectors.

Given the trends above alone, status quo funding for pavement preservation treatments will result in an overall deterioration in the condition of our pavements across the network.

4.6.2 Highway Improvement Needs

The needs for rural highway improvements within the state are quantified in table 4.32 below. The Department has a long history of investing to improve the State's highway system. However, the guiding resource allocation policy that the Department invests under states that MaineDOT maintain our existing system prior to investing in improvements, or expansion. Over the previous three biennia, the Department has invested an average of $152 million dollars in Highway Improvements. This investment has resulted in the improvement of over 500 miles of highway.

4.32 Cost to Construct Maine's Unbuilt Rural Arterials and Major Collectors

Federal Functional Class	Rural Unbuilt Miles	Ave. $ per Mile (to improve)	$ to Improve All Rural Miles (millions)
Principal Arterials	78	$2,900,000	$226
Minor Arterials	117	$1,600,000	$187

Major Collectors	1542	$700,000	$1,079
Total:	**1737**	**$859,400**	**$1,493**

To achieve status quo performance from the highway system requires no additional investment for highway improvements. The traveling public would continue to operate on the existing 1,737 miles of unbuilt, or inadequate roadways with their related springtime weight postings. Given the economic impact of these postings and condition of the inadequate sections of roadway, this is not the strategic goal of the Department.

Highway Investments:

The Department must invest $198 million per biennium for Highway Improvements, a 30% increase over status quo, in order to meet strategic goals.

The funding scenarios table at the end of this executive summary estimates the strategic need of improving 195 miles of inadequate rural arterials within a 10 year timeframe. The total estimated cost of this initiative is over $410 million. Over five biennia, this results in an average biennial investment of $82 million. In the same 10 year time frame, the strategic need of negating all spring time weight restrictions on major collectors, a total of 736 miles is also estimated at a total cost of $515 million or a biennial investment of $103 million. These strategic initiatives along with traditional investments in the minor collector system would require a $198 million biennial investment in highway improvements which represents a 30% increase in funding.

4.6.3 Pavement Preservation Needs

Pavement Preservation Projects are those projects done on a built highway in order to preserve the condition of the pavement. This is accomplished through pavement preventive maintenance practices, which is the practice of first keeping "adequate" highways in good condition and then improving "inadequate" highways as funding allows. An "adequate" highway, for the purpose of Pavement Management and pavement preventive maintenance, is one that meets or exceeds structural and geometric standards. An "inadequate" highway fails to meet structural or geometric standards.

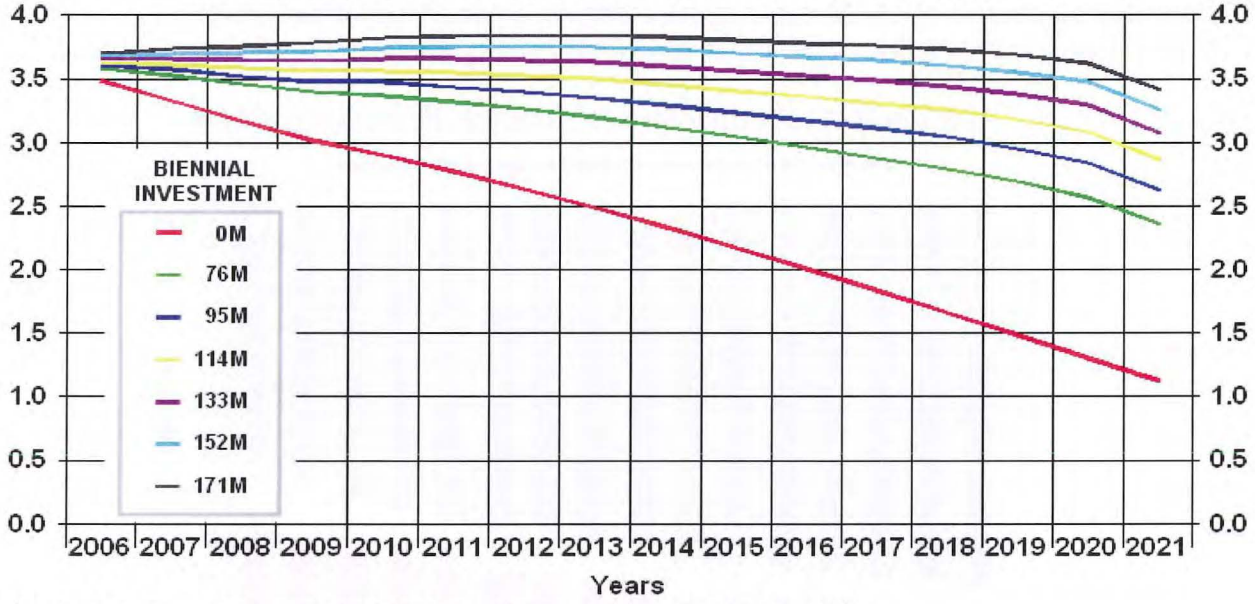
4.33 Treatment Methods, Costs, and Life Expectancy

Treatment Type	Price per centerline mile	Expected Life
BUILT ROADS		
Crack Sealing	$3,000 - $7,000	2 Years
Overlay	$110,000 (PPM) $260,000 (Level 2)	8 – 10 Years
Reclaim/Overlay	$425,000	12 – 15 Years
State PPM	$50,000	6 – 8 Years
UNBUILT ROADS		
Maintenance Surface Treatment (Sand Mix)	$26,500	4 – 6 Years
Collector Highway Improvement Project	$500,000 – $900,000	12 – 15 Years
Highway Improvement	$1,600,000 - $3,200,000	20 Years

4.0 Highways

The following graph shows the average network condition that could be expected on our built highways (arterials and major collectors including Metropolitan Planning Organization (MPO) areas) for various biennial funding levels:

4.34 Average Condition for Built Arterial and Major Collectors



NOTE: The last treatment applied in these analyses is applied in 2020.

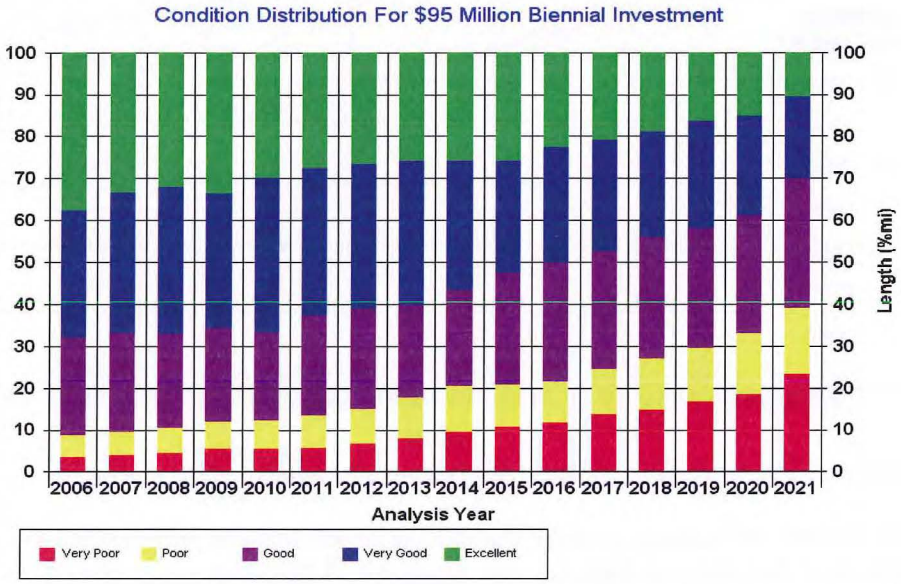
For the last three BTIPs, the funding level for the pavement preservation program has averaged $89.1 million per biennium. For analysis purposes, we consider $95 million per biennium as our baseline or status quo funding scenario. To evaluate the effects of changes in the funding of the pavement preservation program, seven additional funding scenarios were developed, two of which are described in detail below. The reduced funding scenario of $76 million per biennium represents a reduced funding scenario that is 20% below status quo, and the increased funding scenario of $114 million per biennium represents a scenario that is 20% above status quo funding.

The pavement management analyses for status quo, increased, and decreased funding scenarios were conducted using a treatment cost inflation rate of 3%, and a life-cycle cost analysis discount rate of 4%.

Status Quo Funding ($95 Million per biennium)

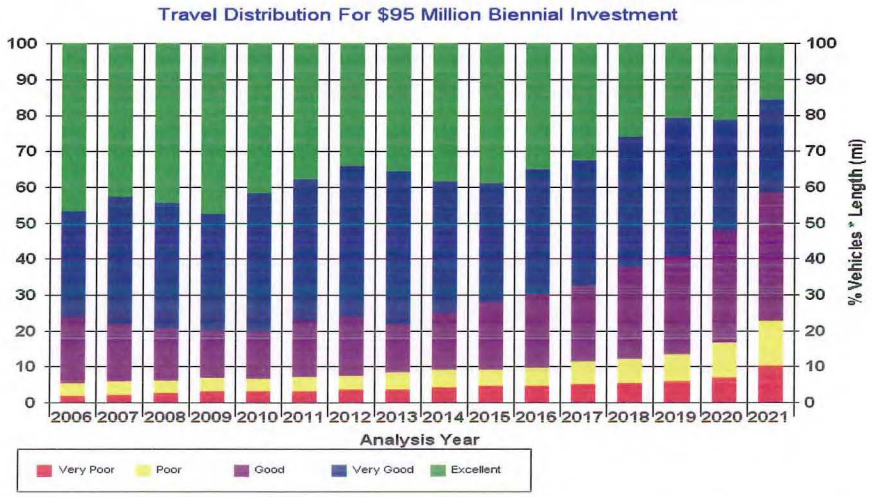
The following chart shows the average network condition distribution over time for built arterial and major collector highways that can be anticipated if funding were held at this level:

4.35 Condition Distribution for $95 Million Biennial Investment



A travel distribution chart was also developed for this same investment level. This chart factors in traffic data for each roadway to show the pavement condition distribution weighted by traffic.

4.36 Travel Distribution for $95 Million Biennial Investment



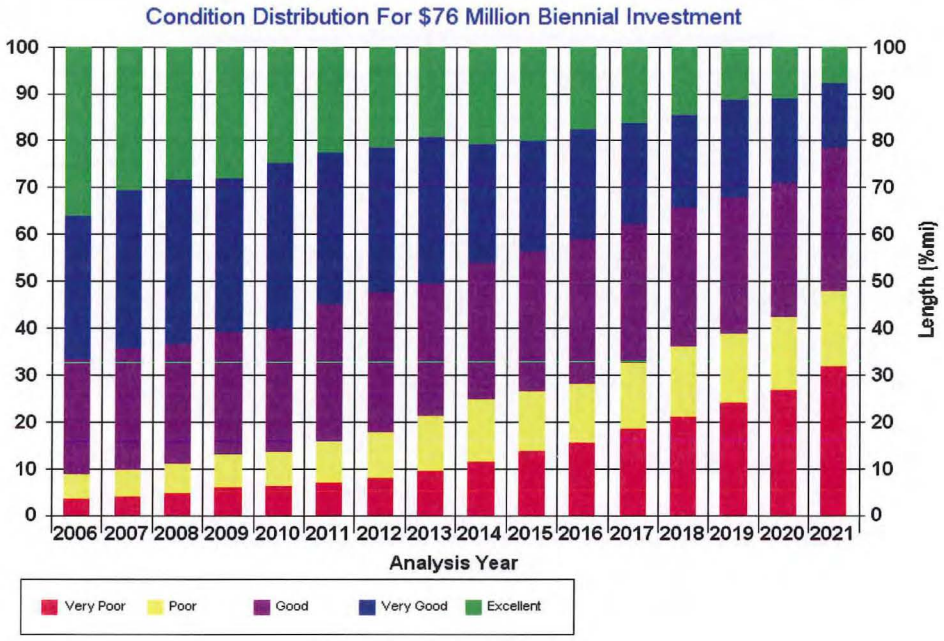
Both of these charts show a steady decrease in overall network pavement condition rating over time at this funding level, with the highest levels of investment being made on the arterial and interstate system, our most heavily-traveled highway systems.

4.0 Highways

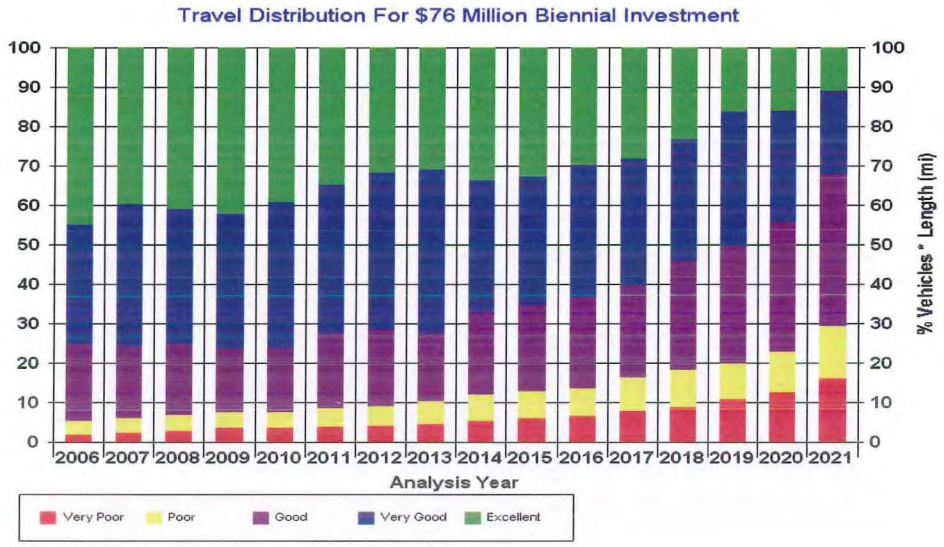
Reduced funding ($76 million per biennium)

The following charts show the average network condition distribution and travel distributions over time for built arterial and major collector highways that can be anticipated if status quo funding were reduced by 20%:

4.37 Condition Distribution for $76 Million Biennial Investment



4.38 Travel Distribution for $76 Million Biennial Investment

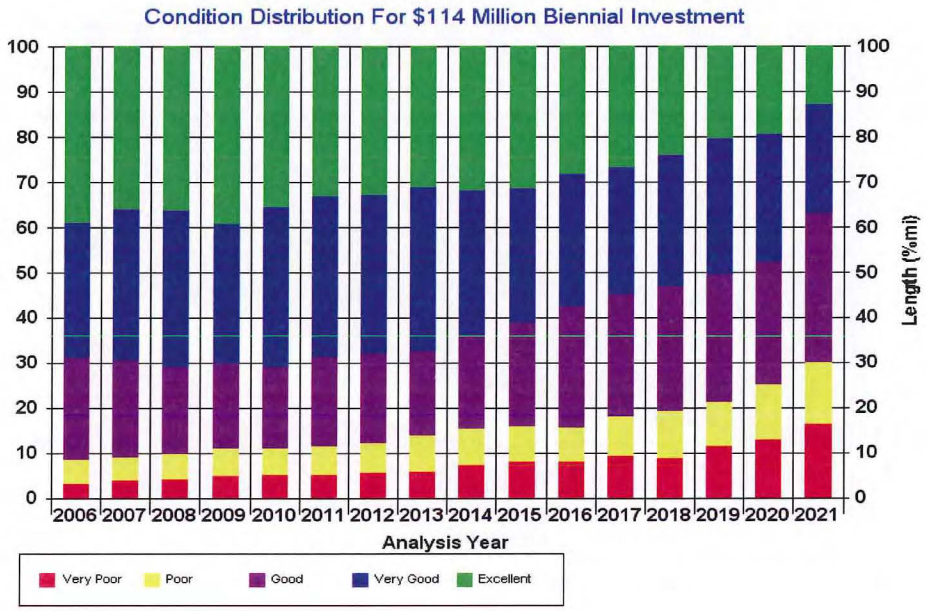


These charts show the accelerated deterioration of average network condition that would result from this investment level.

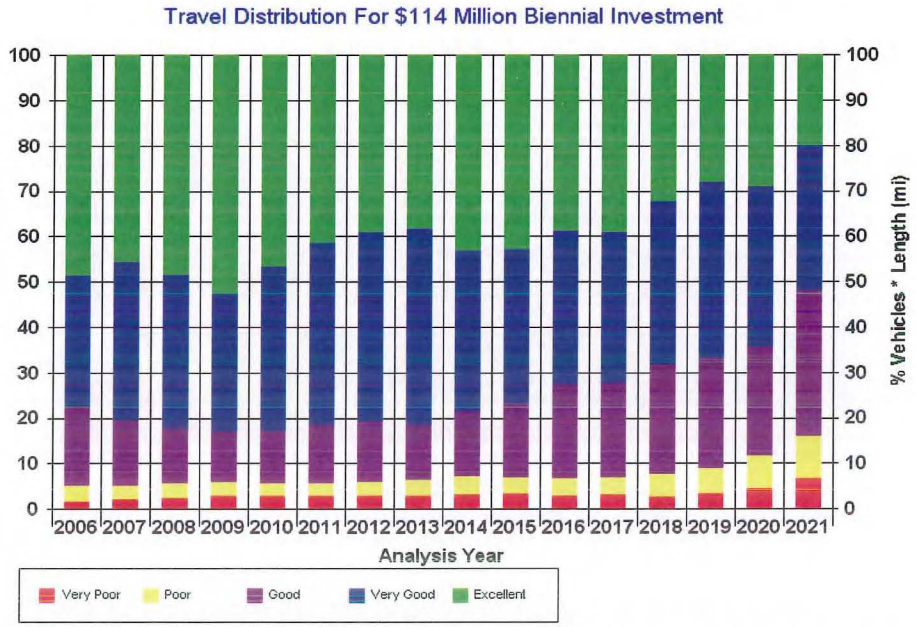
Increased Funding ($114 million per biennium)

The following charts show the average network condition distribution and travel distributions over time for built arterial and major collector highways that can be anticipated if status quo funding were increased by 20%:

4.39 Condition Distribution for $114 Million Biennial Investment



4.40 Travel Distribution for $114 Million Biennial Investment



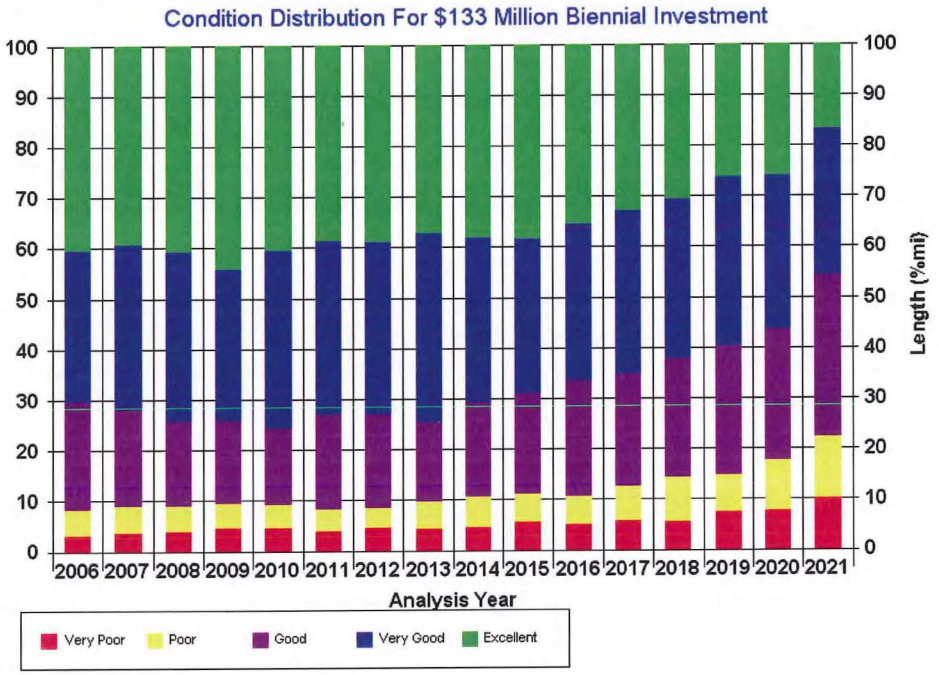
This investment level would begin to stabilize the deterioration of those roadway miles most heavily traveled, but still would result in a steady decrease in condition of our built major collector road system.

4.0 Highways

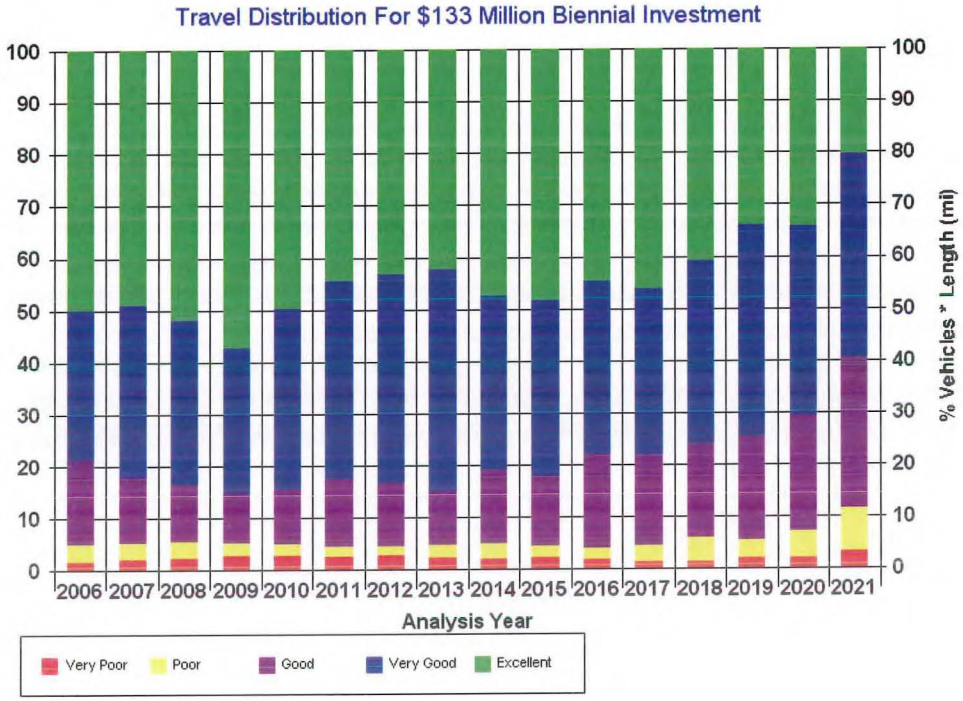
Increased Funding ($133 million per biennium)

The following charts show the average network condition distribution and travel distributions over time for built arterial and major collector highways that can be anticipated if status quo funding was increased by 40%:

4.41 Condition Distribution for $133 Million Biennial Investment



4.42 Travel Distribution for $133 Million Biennial Investment



Bridging the Funding Gap

The Department is constantly exploring innovative treatments in an effort to make our pavement preservation dollars go further. MaineDOT's Bureau of Project Development, in cooperation with Bureau of Maintenance and Operations personnel and equipment, has been able to augment the total miles treated by the Pavement Preservation Program by using state highway crews to perform ditching on some projects the year before a pavement preservation treatment. This reduces the overall cost per mile for these projects, allowing more miles to be preserved.

Maintenance personnel and equipment have also applied maintenance surface treatment (STATE PPM) to some of our built highways using their own trucks, at a lower cost per mile than traditional project contracting methods for equivalent PPM treatments. In fact, the cost of applying maintenance surface treatment (STATE PPM) using MaineDOT haul assets is approximately one-half the cost of traditional contractor-delivered mix.

As shown in figure 4.41, a $133 million capital investment per biennium will be necessary to maintain our built highway network in its current condition for the next 10 years. This level of benefit can be achieved by allocating $111 million in capital expenditure combined with a $10 million increase in the maintenance paving program to place maintenance surface treatment (STATE PPM) on 200 miles of built major collector per biennium.

MaineDOT Maintenance & Operations resources could place an additional 200 miles of maintenance surface treatment (STATE PPM) per biennium on our built major collectors at a cost of about $10 million. This would require a shift in priority from highway maintenance activities such as cleaning culverts and ditching to more support for collector paving, however. As can be seen in the graphics 4.41 and 4.42, this level of investment keeps the built highway network in a relatively good condition for more than a decade.

The $10 million increase in the maintenance paving budget in effect displaces twice the amount ($20 million) in the capital budget.

A Reality Check

In the 2006-07 Work Plan, MaineDOT programmed nearly 504 miles of roadway for pavement preservation projects with an average cost of approximately $161,000 per mile for non-interstate projects. At this rate, and distribution of treatment types, it will take more than 16 years to treat the over 3978 miles of non-interstate built highway. Compounding this issue is the fact that the total number of miles entering the pavement preservation program is growing each year as highway improvement projects are completed. In order to close this gap there is a need for 400 miles of pavement preservation treatments per year, (300 additional miles per biennium), assuming an average treatment life of 10 years. At an estimated average unit price of $161,000 per mile, the need would be nearly $129 million per biennium. This level of investment is very similar to the investment recommendation provided by the Pavement Management Analysis software described above. This is a conservative estimate especially since construction inflation in the delivery of these improvements will result in a much higher cost per mile.

4.6.4 Highway Mobility Needs

As part of its investment policy, MaineDOT invests in a wide range of strategies to improve highway mobility. These strategies include highway projects that improve mobility performance, with or without increases in highway capacity, and non-highway projects that offer improved alternatives to highway transportation. In accordance with the Sensible Transportation Policy Act (STPA), MaineDOT considers the full range of reasonable alternatives before investments are made to increase arterial highway capacity to address mobility needs.

As Section 4.5 illustrated, the future growth of traffic volume on Maine's arterials will lead to a rapid growth in traffic congestion if investments are not made to address highway mobility. Investments in mass transportation and non-highway transportation projects can enhance highway mobility by reducing the traffic demands on the highway network. Funding for these types of projects is addressed in the Passenger and Freight sections. Investments in highway mobility projects address highway mobility needs by physically improving the arterial network. This section focuses on the funding scenarios and implications for these highway mobility projects.

Potential Actions

Each of the three funding scenarios has an impact on the mobility outlook for the arterial network in the 26-year period from 2004 to 2030. Major mobility-enhancing strategies for highways include the following:

Access Management: Preserving and enhancing mobility and safety qualities of a highway by actions such as purchase of access rights, consolidation of driveways and entrances, and other improvements in access point geometry is called access management. Access management minimizes the potential for driveway/entrance traffic to erode the capacity, safety, and efficiency of an existing highway.

Widening for Auxiliary Lanes: Adding lanes such as left-turn (or right-turn) lanes and climbing/passing lanes to remove turning or slower moving traffic from thru lanes also enhances highway mobility. Turn lanes can be used effectively, with or without access management, on arterials where substantial turning traffic exists. Climbing lanes and passing lanes are effective on highway segments with a mix of vehicle speeds.

Installing Thru Lanes: Creating lanes on existing arterials to serve thru traffic provides significant increases in highway capacity where auxiliary lanes alone are not sufficient.

New Thru Lanes at a New Location: Creating new travel lanes on a new alignment to serve thru traffic is another highway mobility strategy. New highway capacity on a new location can serve large volumes of thru traffic that do not need access to the existing arterial.

In the last three BTIPs, more than 80% of the programmed funding for highway mobility projects was directed toward the strategies of adding thru lanes on either existing highways or new locations. Less than 1% of the funding was directed toward access management projects.

Mobility Funding Scenarios

For the last three BTIPs (2002-03, 2004-05, and 2006-07), the funding level for Mobility enhancing highway projects has averaged $40 million per program. This programmed funding is in addition to other highway, bridge, safety, and non-highway capital expenditures described in this report. If this level of funding were to continue through year 2030, the investment in highway mobility projects would total

more than $400 million in the equivalent of $20 million annual increments. This is the baseline, or status quo, funding scenario.

To evaluate the effects of changes in the baseline funding scenario, two additional funding scenarios were developed. The reduced funding scenario, at $16 million per year, is 20% less than the baseline scenario. The increased funding scenario, at $24 million per year, is 20% more than the baseline scenario.

Implications

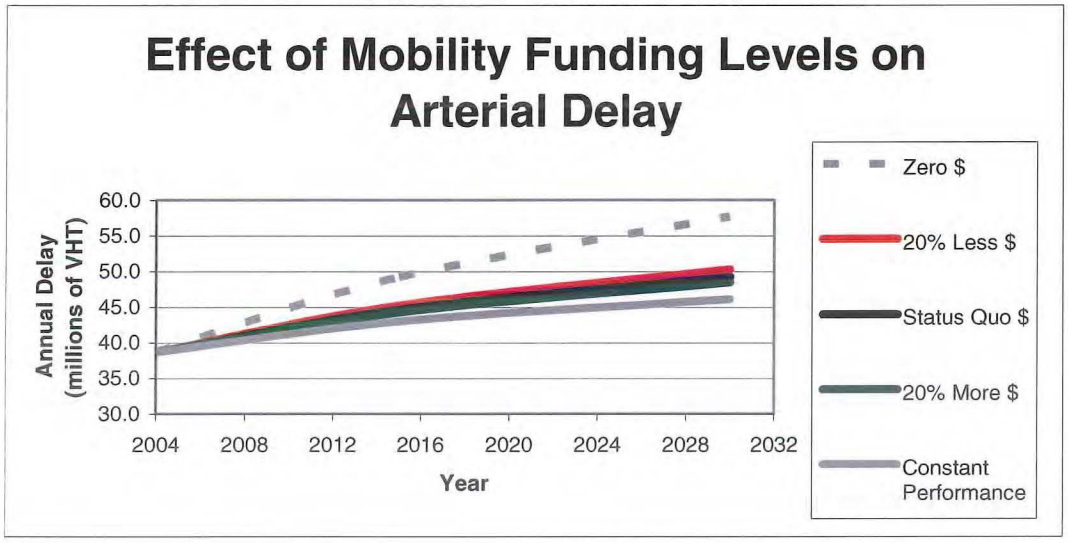
An optimum investment of funds under the three scenarios will result in a mix of investments best suited to the need to improve mobility in the arterial network. In figure 4.43 these potential mixes are shown for each of the three scenarios and compared to the historic mix of investments from the last three BTIPs. Under any of the scenarios, the optimal mix of investments is more balanced than the historic pattern of funding. The share of funding directed toward access management would be increased from near 0% to near 19%. If the annual investment level were to increase, the mix would shift slightly away from auxiliary lanes toward new thru lanes on new location.

4.43 Potential Mix of Actions for Three Funding Scenarios

Funding Scenario	Historic	20% Less	Status Quo	20% More
Annual Investment ($ millions)	20	16	20	24
Mobility Improvement Strategy	Investment Share			
Access Management	0%	19%	19%	18%
Installing Auxiliary Lanes	20%	15%	13%	12%
Widening for Thru Lanes	39%	38%	37%	38%
New Thru Lanes at New Location	41%	28%	31%	32%

Figure 4.44 shows the impact of the three mobility funding scenarios on congestion in the arterial network as measured by annual delay VHT (Vehicle Hours Traveled). Under each of these scenarios, congestion in the arterial network increases, but higher funding levels result in smaller increases.

4.44 Effect of Mobility Funding Levels on Arterial Delay



For additional comparison, a "Zero $" funding scenario and a "Constant Performance" trend line are shown as well. These two lines, respectively, are equivalent to the delay and travel growth trends in

Figure 4.30. The zero funding scenarios show growth in delay if no investments are made to improve mobility. The constant performance line shows a growth in delay that equals the growth in VMT. If the growth in delay follows the constant performance line, then travelers would experience the same amount of delay per mile traveled as they do now. In the constant performance scenario, increased delay on the overall system is a result of an increase in use, not a decrease in mobility.

Scenarios with lines above the constant performance line indicate worse mobility for future travelers than current conditions provide. The three funding scenarios will keep congestion growth well below the zero funding scenarios. They will not be sufficient to maintain a constant level of performance in the overall arterial network, as each of these scenarios lies above the constant performance line. The level of investment needed to maintain the current overall level of mobility performance is estimated to be $60 million, annually.

In general, mobility improvements that have been funded in the past have had a benefit/cost (b/c) ratio of 2.0 or more. That is, the measurable benefits of the improvement are valued as being at least twice the cost of the improvement. If the funding strategy for mobility improvements is to fund all candidate improvements with a b/c ratio of 2.0 or more, an estimated $25.6 million would be needed annually ($51.2 million biennially). The level of funding to meet this strategic need is slightly higher than the "20% More" funding scenario ($24 million annually).

4.7 Conclusions

4.45 Maine's Highway Needs (in millions of 2005 dollars)

Highway Network	2002-2003	2004-2005	2006-2007	STATUS QUO Investment Level (Average Over 3 Biennia)	To Maintain Constant Performance/ Condition	Biennial Strategic Need
Highway Improvements	172.6	127.9	147.7	152.0	0.0	198.0
Arterials	75.6	75.1	84.4	78.4	0.0	82.0
Major Collectors	77.4	51.0	53.7	60.7	0.0	103.0
Minor Collectors	19.7	9.5	9.6	12.9	0.0	13.0
Pavement Preservation	102.0	97.0	69.6	89.5	111.0	111.0
Maintenance Paving	22.8	30.3	28.2	27.1	40.0	40.0
Highway Mobility	47.5	35.1	34.1	38.9	120.0	51.0
Total:	**345.6**	**295.4**	**290.5**	**310.5**	**271.0**	**400.0**

4.7.1 Highway Condition

Section 4.3 of this report illustrates the steady deterioration of pavement condition and ride quality network-wide since 1999, most notably in the minor arterial and major collector classes. This deterioration is likely to continue, and perhaps even accelerate, as a result of the combined effect of decreased funding of the pavement preservation program and the significant increase in construction costs caused by the volatility of the petroleum markets.

As shown in the analysis found in Section 4.6, a $133 million capital investment per biennium will be necessary to maintain our built highway network in its current condition for the next 10 years. We have proposed achieving this $133 million capital investment level of benefit by allocating $111 million in capital improvement funds combined with increasing the Maintenance Paving program by an additional $10 million to provide maintenance surface treatment (State PPM) on an additional 200 miles of built major collector per biennium. Lesser funding levels will result in continued deterioration of our overall built highway network condition.

4.7.2 Mobility

Sections 4.4 and 4.5 of this report have shown that VMT continue to increase on Maine's highway network and that traffic congestion, measured in vehicle-hours of delay, is increasing at a more rapid rate. Nevertheless, 90% of the arterial mileage in Maine never, or rarely, reaches its traffic capacity limits. In 2030, this percentage is expected to drop to 84%. Therefore, 10% of arterial mileage reaches capacity on at least a seasonal or peak-hour basis. That number would increase to 14% by 2030.

In Section 4.6, the cost of maintaining a constant level of mobility performance, with no overall increase in the delay per vehicle-mile, has been estimated to be $60 million per year, or $120 million biennially. However, this is a level of investment that would be excessive, as figure 4.46 shows. Annual funding levels of $16, $20, and $24 million show reductions in delay that are worthwhile returns on the added investment. For example, a $4 million annual funding increase (20% more) above status quo funding yields a $10 million reduction in annual delay costs, a b/c ratio of 2.50. However, an additional $36 million increase in mobility funding yields only $28 million in reduced delay costs, a b/c ratio of 0.78. While a $4 million increase in annual mobility funding is a cost-effective investment, a $40 million increase is not. The $24 million per year ($48 million biennially) is close to the Strategic Need funding level to implement all improvements with a b/c ratio of 2.00 or higher.

4.46 Cost Effectiveness of Mobility Funding Scenarios

Mobility Funding Scenario	Annual Funding ($ millions)	Annual Delay in 2030 (millions of VHT)		2030 Delay Reduction ($ millions)	B/C Ratio of Added Funding
		Total	Reduction		
Zero $	$ -	57.7	0.0	$ -	-
20% Less $	$ 16	50.3	7.5	$ 90	5.63
Status Quo $	$ 20	49.3	8.4	$ 101	2.75
20% More $	$ 24	48.5	9.2	$ 111	2.50
Constant Performance	$ 60	46.1	11.6	$ 139	0.78

Also in Section 4.6, historic funding for mobility improvements has indicated that over 80% of the funds have been channeled to improvements that add thru lanes on either existing highways or new locations, but that less than 1% of mobility funding has gone to access management. In the future analysis of funding scenarios, adding thru capacity is likely to continue to be a major strategy, but access management should account for an increased share of the funding allocation for mobility improvements. Figure 4.46 suggested that 18 or 19% of mobility funding be directed toward access management.

5.0 Bridges

5.0 Bridges

Wiscasset-Edgecomb, Donald Davies Bridge

The State of Maine has full or partial responsibility for 2,967 bridge and minor span structures with lengths ranging from 10 feet to 4,750 feet. The following report details the assets, condition and funding needs of this network.

5.1 Bridge Network

The State of Maine has full responsibility for capital improvement and maintenance of 775 minor spans (10 feet to 20 feet long) and 1,962 bridges generally equal to or greater than 20 feet in length, and 21 extraordinary bridges. Extraordinary bridges are 250 feet or more in length and require improvements of at least $5 million each in the next 20 years.

In addition, the state will pay half of the capital improvement costs for 209 low-use/redundant (town maintained) bridges on town ways if a compelling public benefit is demonstrated. Low use/redundant bridges are those bridges on town ways that either serve fewer than 100 vehicles per day or are close to other crossings (average annual daily traffic multiplied by the detour length is less than 200). Some low use/redundant bridges have serious deficiencies from an engineering standpoint, but are given low priorities due to their minimal benefit to the traveling public.

This report examines the state's bridge and minor span network in terms of the following indicators: age, percent sufficient (the percentage of structures with a federal sufficiency rating greater than 60), federal sufficiency rating weighted by deck area; extraordinary bridge needs; and priority functional needs. In aggregate, these indicators provide valuable planning insight for the state's current bridge and minor span inventory. Excluded from this report are: new crossing sites where there has been no bridge construction to date; structures used exclusively for rail, pedestrian or snowmobile traffic; structures owned by the Maine Turnpike Authority, federal agencies, or private entities; and minor spans on town ways owned and maintained by municipalities.

5.1.1 Age of Maine's Structures

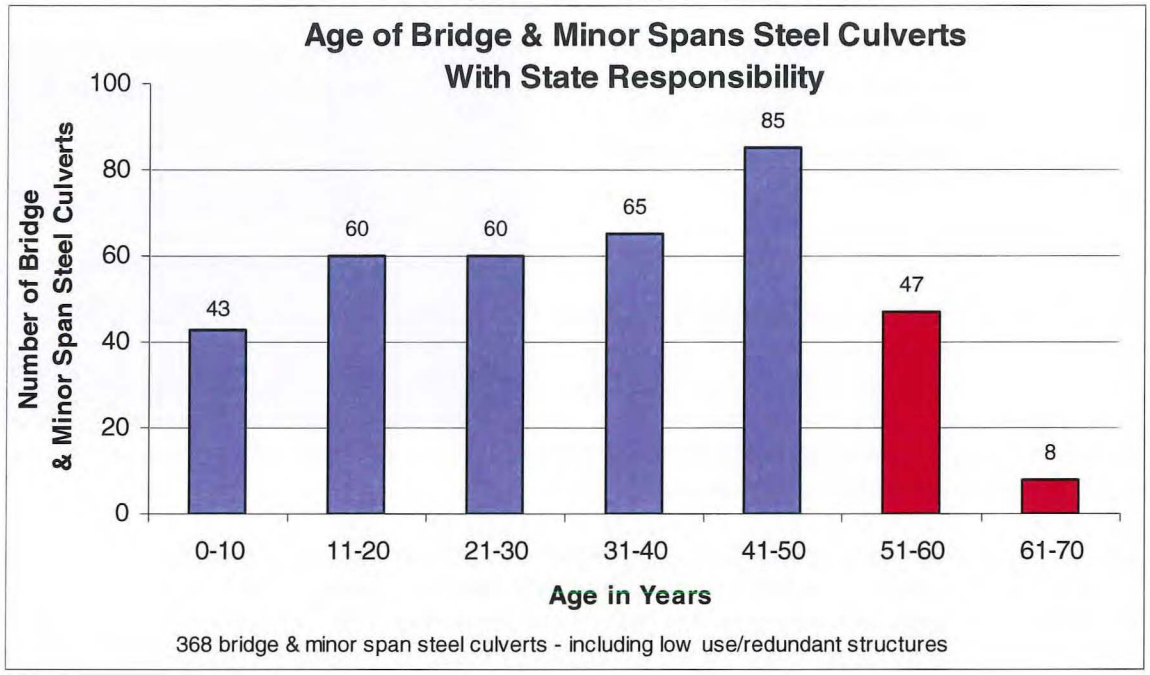
Of the 2,967 structures with state responsibility, 368 are steel culverts and 2,599 are traditional structures. The steel culverts typically have a service life of about 50 years while the traditional structures normally have a service life of about 80 years. While age is an indicator of future needs, it cannot be solely relied upon to determine the timing of capital improvements because design features, past maintenance actions, and environmental considerations also influence service life.

5.1.2 Age of Bridge & Minor Span Steel Culverts

In 2004, there were fifty-five (55) steel culverts that exceeded their normal service life of 50 years. Note the red bars in the chart shown below. Of the steel culverts older than 50 years, six (6) are already programmed for capital improvement and eleven (11) have been identified as candidates for the next Six-Year Plan. None of these structures over 50 years old are low use or redundant bridges.

5.0 Bridges

5.1 Age of Bridge & Minor Spans Steel Culverts



5.1.3 Age of Traditional Bridges and Minor Spans

In 2004, 192 of the traditional structures have exceeded their normal service life of 80 years, more than twice the number reported in the 2002 State of the System Report. Note the red bars in figure 5.2. Of this number, 4 structures (2%) have already been programmed for capital improvement and (3%) have been identified as candidates for improvement in the six-year plan. It should be noted that 13% of the traditional structures with an age greater than 80 years are low-use/redundant bridges.

5.2 Age of Traditional Bridges & Minor Spans

5.0 Bridges

5.2 Federal Sufficiency Rating (Percent Sufficient Bridges)

The sufficiency rating is based on a combination of four factors used to determine a number from 0 to 100 (0 is worst, 100 is best) that describes the overall sufficiency of each structure. The four factors are:

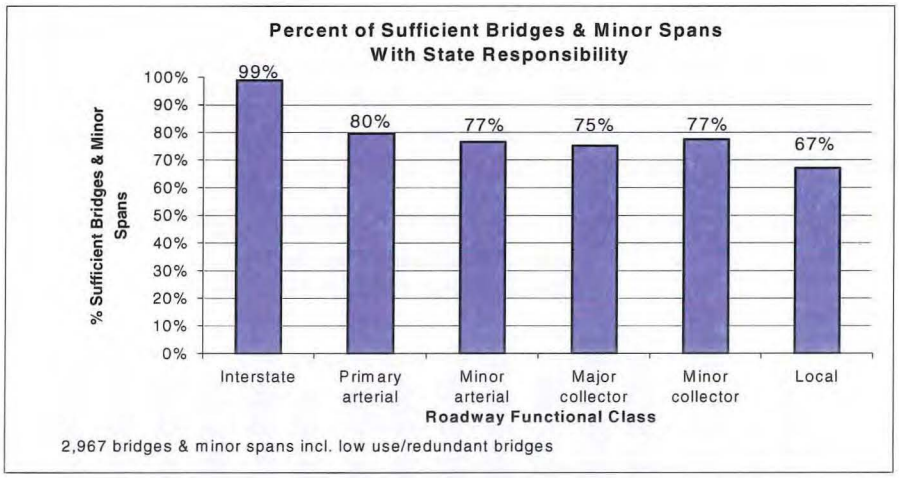
1. Structural Adequacy and Safety
2. Serviceability and Functional Obsolescence
3. Necessity for Public Use
4. Special Reductions (detour length, traffic safety features)

Bridges with a sufficiency rating of greater than 60 are considered to be structurally and functionally "sufficient" or unlikely to need capital improvements for at least 10 years, except for the possibility of paint or wearing surface work. Tracking the percentage of structures with a sufficiency rating of greater than 60 is a good proxy for the overall condition of Maine's bridges and minor spans.

5.2.1 Sufficiency of Maine's Bridges and Minor Spans

The chart that follows shows the percent of sufficient bridges and minor spans based upon the federal functional class of the roadway (excluding minor spans on town ways and extraordinary bridges). As expected, the vast majority of interstate structures are sufficient, whereas structures on local roads distinctly lag behind all others.

5.3 Percent of Sufficient Bridges and Minor Spans



Produced by the MaineDOT Bridge Management Section 2004

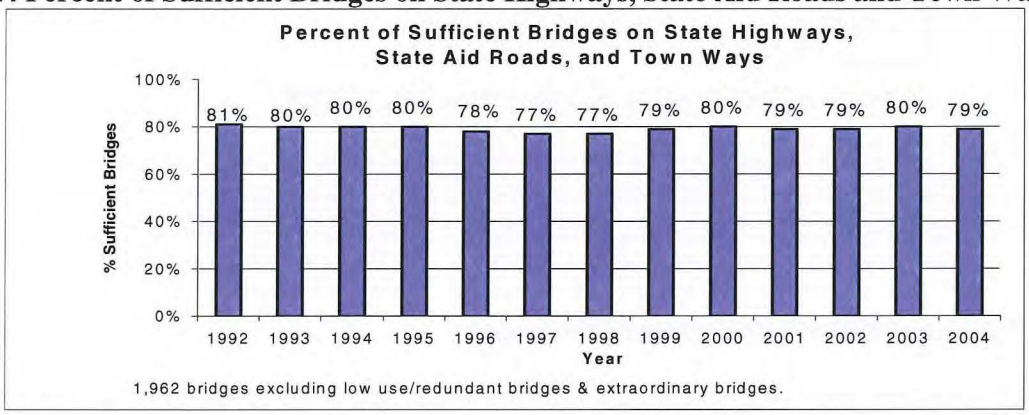
From 2000-04, the percentage of sufficient bridges and minor spans remained constant for the interstate with 99% of the structures in sufficient condition. The most significant increase in the number of sufficient structures was in the category of primary arterials (+2%), reflecting MaineDOT's commitment to programming high benefit projects. There was no change in the percentage of sufficient structures carrying minor arterials and major collectors. There was a slight increase in the number of sufficient structures carrying local roads and a slight decrease in the number of sufficient bridges and minor spans carrying minor collector roads.

About 65% of the 2,967 structures with total or partial state responsibility are "bridges" on state highways, state aid roads and town ways. These are defined as structures greater than 20 feet in length.

5.0 Bridges

They represent the largest and most important piece of the state's roadway structure inventory. The following chart shows that 79% of these bridges are currently sufficient, and that this percentage has been fairly stable for the last decade. (This chart does not include low use/redundant bridges on town ways or extraordinary bridges.)

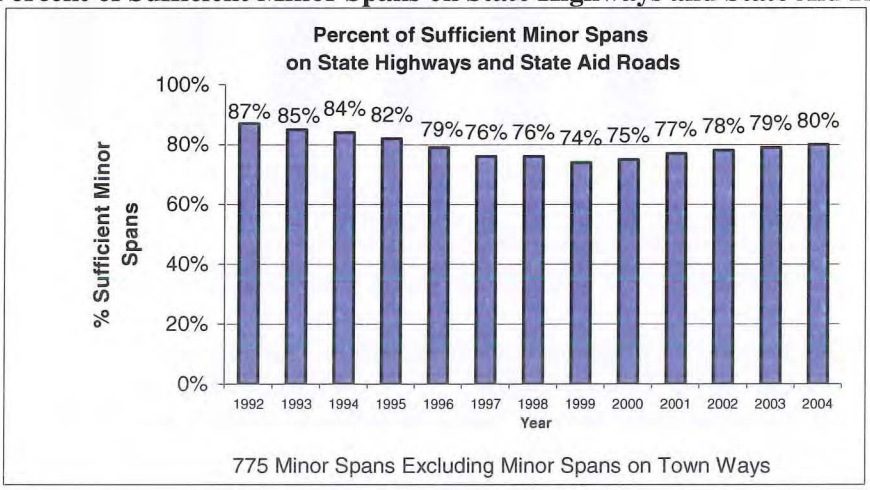
5.4 Percent of Sufficient Bridges on State Highways, State Aid Roads and Town Ways



The State of Maine is totally responsible for funding capital improvements for 775 minor spans that carry state aid roads or state highways. There has been an upward trend in sufficiency since 2000. In 2004, 80% of the minor spans with state responsibility were sufficient. However, even with this positive change in condition, the percentage of sufficient minor spans still remains below the 1992 level of 87% sufficient.

The present upward trend in the condition of minor spans is not unexpected, since funding for these structures increased significantly in the 2002-03 Capital Work Plan. If funding were to remain at a level similar to the 2006-07 work plan (about $6 million/biennium), then that level of funding would be adequate to address the needs of minor spans for the next six years.

5.5 Percent of Sufficient Minor Spans on State Highways and State Aid Roads

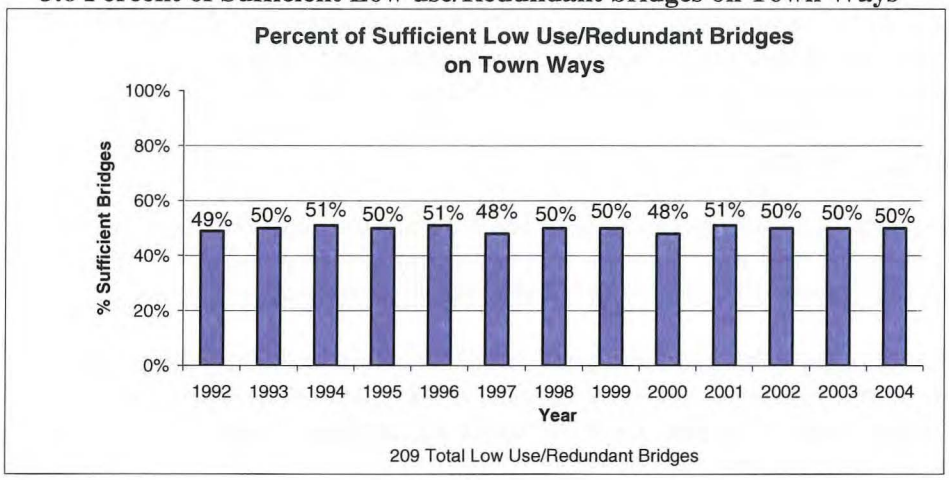


As a result of the Local Bridge Law passed in 2001, MaineDOT is partly responsible for 209 low-use/redundant bridges on town ways. As of 2004, 50% of the low use/redundant bridges were sufficient. The low priorities associated with low use/redundant bridges, together with anticipated shortfalls in funding, suggest that very few of these bridges will receive financial assistance in the near future.

5.0 Bridges

MaineDOT will continue to perform safety inspections on low use/redundant bridges, in order to protect the traveling public.

5.6 Percent of Sufficient Low use/Redundant bridges on Town Ways

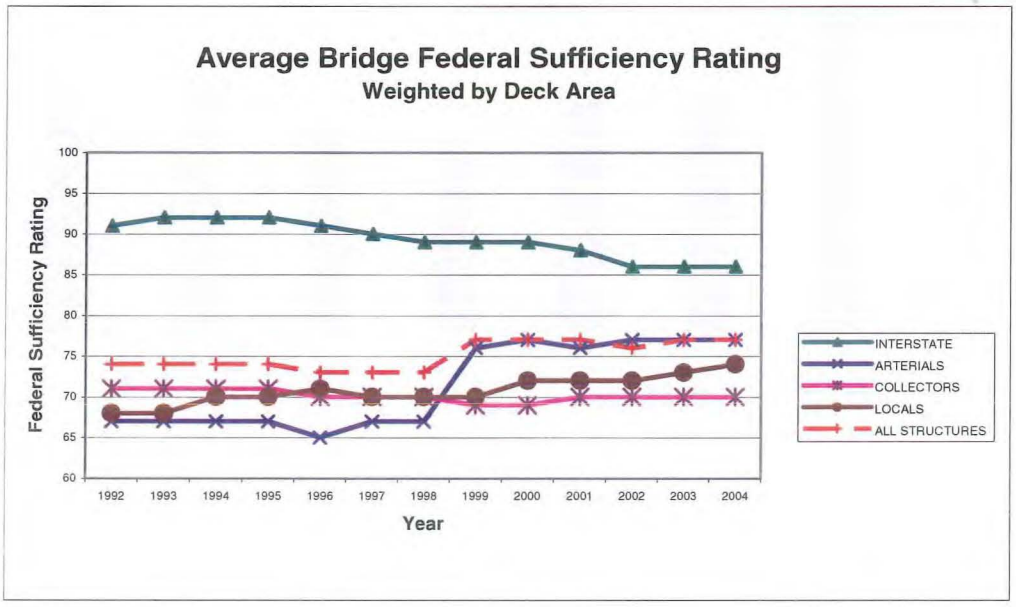


5.3 Bridge Adequacy

Another method of assessing the overall condition and functionality of Maine's structures is to use the average Federal Sufficiency Rating weighted by deck area. Weighting the sufficiency ratings by deck area will more accurately reflect the condition of the total bridge network because more weight is given to the sufficiency ratings of the larger structures which represent a larger proportion of the investment in the bridge network. As shown in figure 5.7, this indicator has proven quite consistent over time, with the exception of a significant increase in 1999 for bridges carrying arterial highways. This increase is attributed to capital improvement projects for eight large structures.

The 1992 to 2004 chart is based on the ratings of all 2,967 structures for which the state has responsibility, including extraordinary bridges and low-use/redundant bridges.

5.7 Average Bridge Federal Sufficiency Rating



5.0 Bridges

When weighted by deck area, the average federal sufficiency rating for Maine's structures remained at 77. While the total number of sufficient structures has increased, the improvements have not impacted enough of the total deck area to warrant a similar increase in this performance measure.

As one might expect, the structures carrying higher federal functional class roadways are in the best condition, reflecting MaineDOT's commitment to funding improvements for those structures that carry the most traffic and thus afford the most benefit to Maine's people and economy.

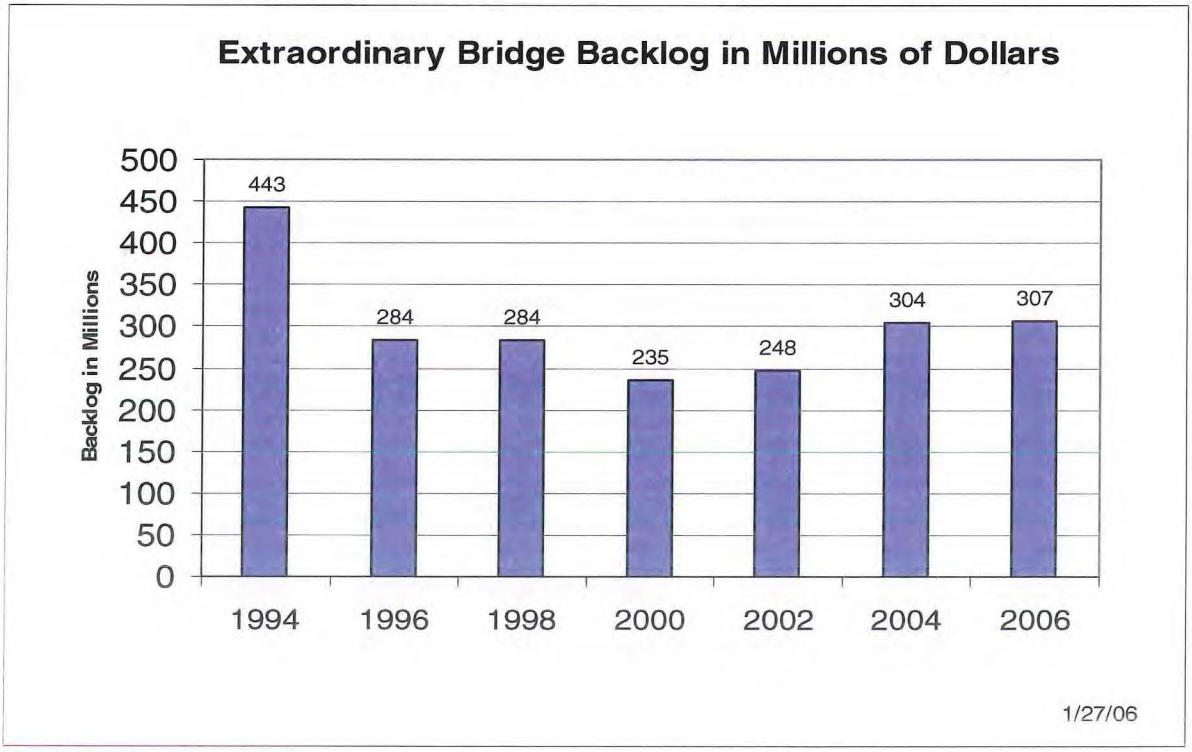
5.4 Extraordinary Bridges

Extraordinary bridges are 250 feet or more in length and have an improvement cost of at least $5 million. MaineDOT has spent more than 1/2 of its total bridge improvement dollars over the last four biennia to fund projects that address the capital improvement needs of extraordinary bridges.

In 1994, the extraordinary bridges required $443 million worth of capital improvements. The extraordinary bridge capital improvement needs have since been decreased to the current level of $307 million. It is important to note that several of the 21 extraordinary bridges that still require capital improvement are in very poor condition.

There are some traditional bridges that are 250 feet or more in length with capital improvement costs approaching $5 million each. Over time, inflation will cause the improvement costs to rise to $5 million or more. At that point, these traditional structures will qualify as extraordinary bridges by definition, which will impact future funding scenarios.

5.8 Extraordinary Bridge Backlog in Millions of Dollars



While the extraordinary bridge capital improvement needs have been reduced by about one third over the past 12 years, there still remains an additional $307 million worth of work to be done. Extraordinary

bridge needs have been identified for the next 20 years and are summarized in figure 5.9, along with the cost of the improvement, and the remaining amount of funding required for completion of the work.

5.9 Extraordinary Bridge Needs 2004-2025

Town	Name	Age Years	Scope	Previous Funding $ Millions	Projected Need 2008-2013 $ Millions	Projected Need 2014-2025 $ Millions
Augusta	Memorial	56	Replace Deck & Paint	4.75	8	0
Bath-Woolwich	Carlton Bridge	79	Rehabilitation	23.325	12	0
Bath	West Approach	47	Improvement	2.3	0	35
Boothbay	Knickerbocker	75	Replacement	0.2	7	0
Brunswick-Topsham	Frank J. Wood	74	Improvement	1	0	10
Canaan	Sibley Pond	66	Replacement	0	0.5	8
Caribou	Aroostook River	53	Improvement	3	0	4
Deer Isle-Sedgwick	Deer Isle Sedgwick	66	Improvement	12	9	0
Fort Kent-New Brunswick	International	76	Improvement	2.11	11*	0
Greene	Turner Center	68	Improvement	0	5.7	0
Harpswell	Bailey Island	79	Superstructure Replacement	5.325	7	0
Howland	Penobscot River	59	Improvement	0.185	0	7
Howland	Piscataquis	77	Replacement	0	8.5	0
Jonesport-Beals	Beals Island	47	Improvement	0	0	25
Kittery-Portsmouth	Memorial Bridge	82	Rehab & Paint	2.1	22*	0
Kittery-Portsmouth	Sarah Mildred Long	65	Rehab & Paint	0	19.3	0
Norridgewock	Covered	77	Replacement	6	11.5	0
Portland-Falmouth	Martin Point	62	Improvement	0	0	25
Prospect-Verona	Downeast Gateway	0	Replacement	85	3.6	1.4
Prospect-Verona	Waldo Hancock	74	Removal	5.5	15	0
Richmond-Dresden	Maine Kennebec	74	Rehabilitation	1	15	0
Portland – S. Portland	Veterans Memorial	51	Replacement	0	31	0
York	New	48	Improvement	0	0.5	5
*Maine Share Only	**Average Age:**	**66.1**	**Total Cost:**	**153.795**	**186.6**	**120.4**

5.0 Bridges

5.5 Priority Functional Need Bridges

Priority functional need bridges are bridges and minor spans with needs that are solely functional. These bridges are functionally obsolete and not structurally deficient. The types of deficiencies include, but are not limited to, structures with insufficient vertical clearance, narrow bridges/minor spans, or structures with poor alignment. Of those structures classified as functionally obsolete, only those with a federal sufficiency rating of less than 60 are considered as potential priority functional need bridges/minor spans. A history of structure-related crashes does increase the possibility that a bridge or minor span will be included in this category, as does substantial public interest in improving the structure for functional reasons.

Generally, MaineDOT funds improvements that address structural deficiencies before programming improvements solely to correct functional problems. However, there are some safety considerations which allow a structure classified as a priority functional need to compete with a structurally deficient bridge/minor span for funding.

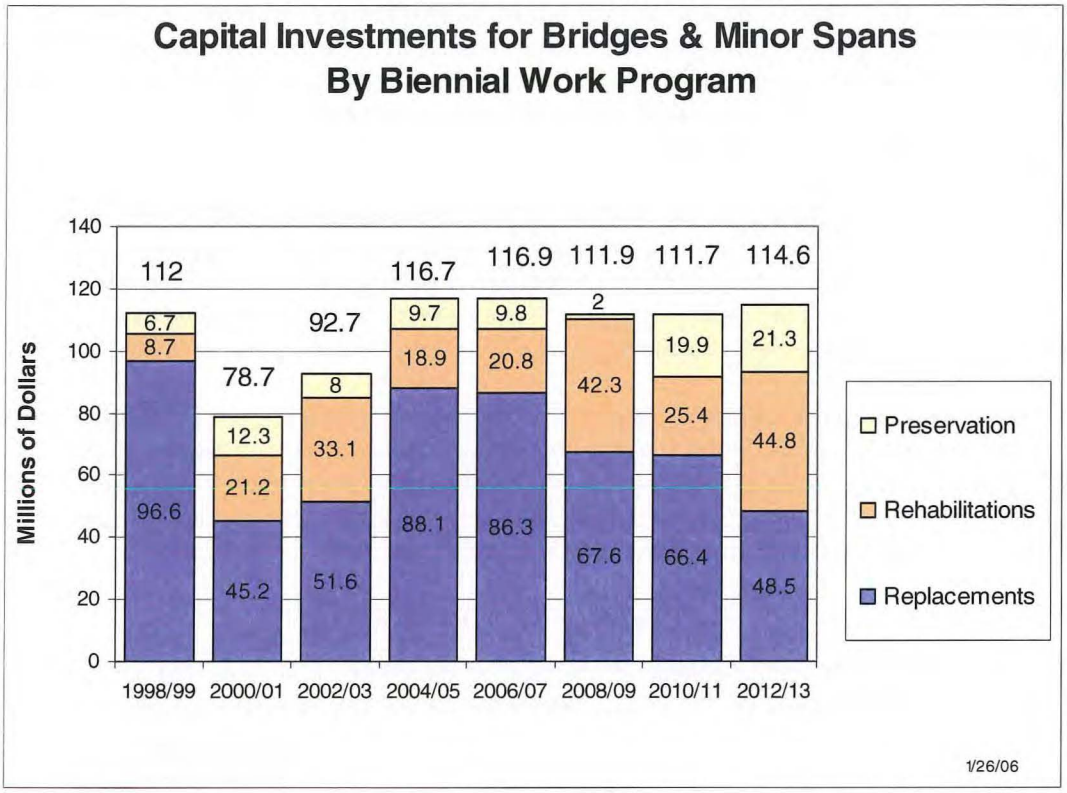
Presently, MaineDOT has identified eleven (11) structures as priority functional need bridges/minor spans. It is estimated that improvements necessary to correct these functional deficiencies will cost $20 million. More than two thirds of the priority functional improvements identified will be bridge replacements. Other structures may be rehabilitated (e.g. widened) if they are deemed to be of historic value.

If the roadway and the structure are both considered functionally deficient, then the timing of the structural improvement may be coordinated with the roadway improvement to achieve cost savings and to minimize disruption to the traveling public.

Arrowsic-Georgetown, Back River Bridge

5.6 Funding Scenarios and Future Implications

5.10 Capital Investment for Bridges & Minor Spans



The chart above depicts the types of capital improvements programmed or projected for 1998 to 2013. The preservation work included in the capital work plan for bridges consists of wearing surface replacements and bridge painting. Over the last decade, an average of $9 million per biennium has been expended on preservation improvements. The funding constraints in past capital work plans have caused needed preservation work (predominantly bridge painting) to be deferred. It is presently estimated that $40 million will be required to paint structures in the next six (6) years. More than 1/3 of these monies will be required to paint two extraordinary bridges:

Kittery Memorial Bridge	$ 7M
Augusta Memorial Bridge	$ 8M

Less than 10% of the estimated preservation needs in the next six years consist of wearing surface replacements. Many highway paving projects now include bridge wearing surface replacements in order to minimize construction costs and to minimize construction disruption to the traveling public.

On average, MaineDOT has invested about $25 million per biennium to rehabilitate bridges. Included in the rehabilitation category is a subcategory called "bridge improvements" which may be either rehabilitation projects or replacement projects based upon the findings of preliminary engineering studies.

While the 1998-1999 Work Plan was significantly higher than any other program in the past decade, the amount expended on extraordinary bridges has been fairly consistent, ranging from $50-65 million per biennium. The 2008-2009 Capital Work Plan will fund at a slightly higher level at $75 million of the total projected need of $112 million.

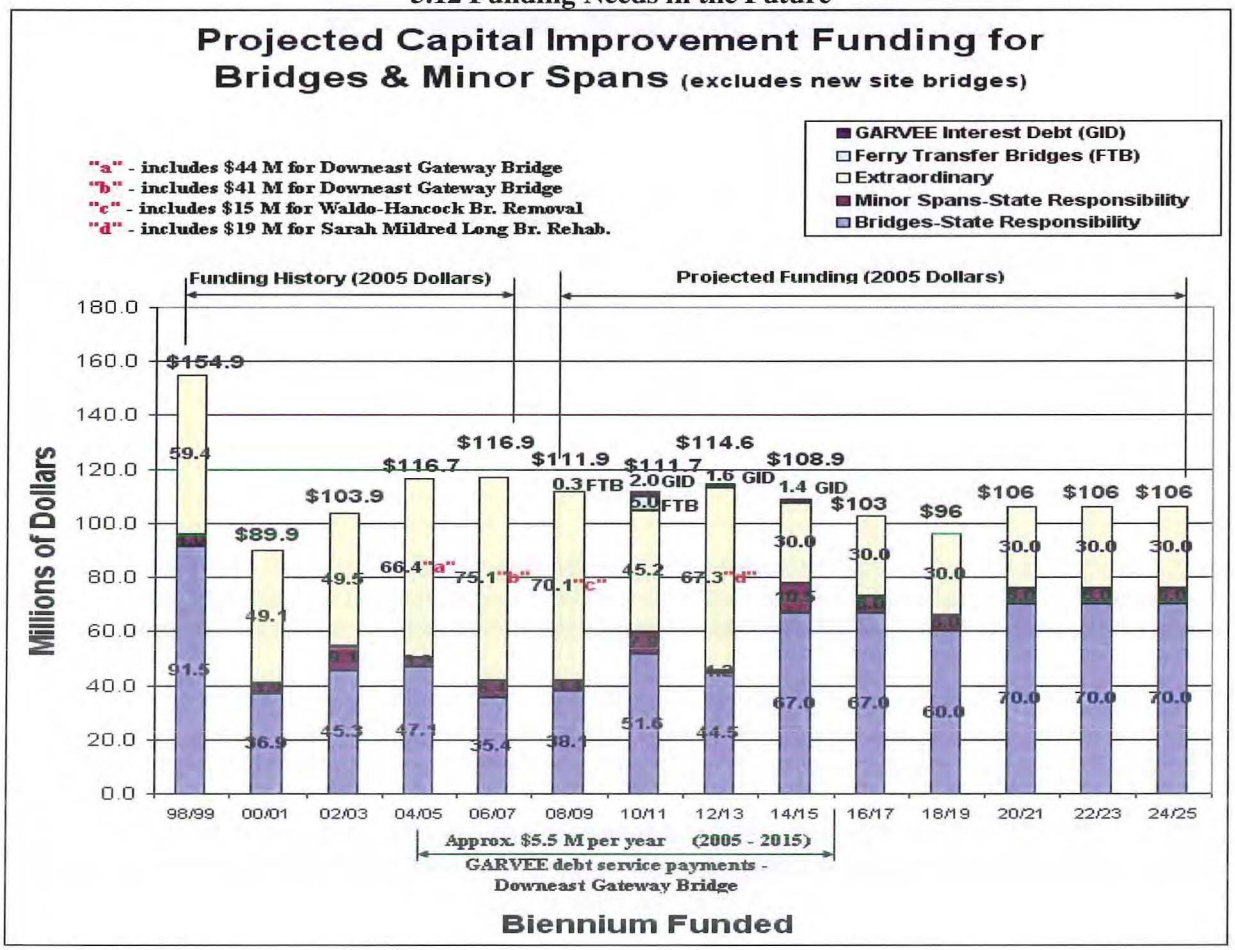
5.0 Bridges

The 2006-07 Capital Work Plan included only one project for a low use/redundant bridge at a cost of less than $1 million. This level of funding is not adequate to address the needs of structures in this category. In 2004, only 50% of the low use/redundant bridges were sufficient (assigned ratings of 60 or above). If MaineDOT continues to fund these bridges at this level of funding per biennium, it is anticipated that the sufficiency of low use/redundant bridges will decline over the next 20 years. However, since municipalities and counties are primarily responsible for these bridges, several have been improved without MaineDOT involvement or cost sharing. Therefore some improvements in this category are possible solely based upon local initiatives.

The State of Maine is responsible for the cost of capital improvements for 1,962 bridges that are 20 feet long or more. This group of structures includes bridges on town ways, state highways, and state aid roads. Over the last six years, MaineDOT has expended an average of $41.1 million per biennium to improve these structures and the result has been a slight decrease in the percentage of sufficient bridges. In 2004, 79% of these bridges were sufficient.

Figure 5.12 is based upon the assumption that there will be adequate funding for 2008-09 extraordinary bridge needs now estimated at $70 million. The projected decrease in extraordinary bridge needs would allow a higher percentage of bridge funds to be expended on bridges on town ways, state highways, and state aid roads. Deferral of needed capital improvements results in further unchecked structural deterioration and may lead to even higher capital improvement costs.

5.12 Funding Needs in the Future



5.0 Bridges

The bridge projections in figure 5.12 above were established using the methodology developed in the MaineDOT Bridge Management Section. The scopes and costs of future improvements, and the timing of the improvements, were individually determined using inspection ratings and inventory data, and based in part on field reviews conducted by bridge engineers and environmental scientists. Figure 5.12 depicts the funding levels needed to address the bridge and minor span needs and the extraordinary bridge needs statewide over the next 20 years.

5.7 Conclusions

5.13 Maine Bridge Needs (in millions of 2005 dollars)

Bridge Network	2002-2003	2004-2005	2006-2007	STATUS QUO Investment Level (Average Over 3 Biennia)	To Maintain Constant Performance/ Condition	Biennial Strategic Need
Extraordinary Bridges	49.5	66.4	75.1	63.7	50.0	70.8
Bridges	45.3	47.1	35.4	42.6	56.5	69.4
Minor Spans	9.1	3.2	6.4	6.2	6.0	7.6
Totals	**103.9**	**116.7**	**116.9**	**112.5**	**112.5**	**147.8**

The Strategic Need funding level for the bridge program is to address the needs identified in figure 5.12 for the next (2008 -2009) Work Plan. Funding the 2008 -2009 bridge program at this level of $111.9 million would provide for a future performance/condition funding level of approximately $106 million biennially. The consequence of deferring projects would include continued major maintenance and holding actions required to keep these structures in service.

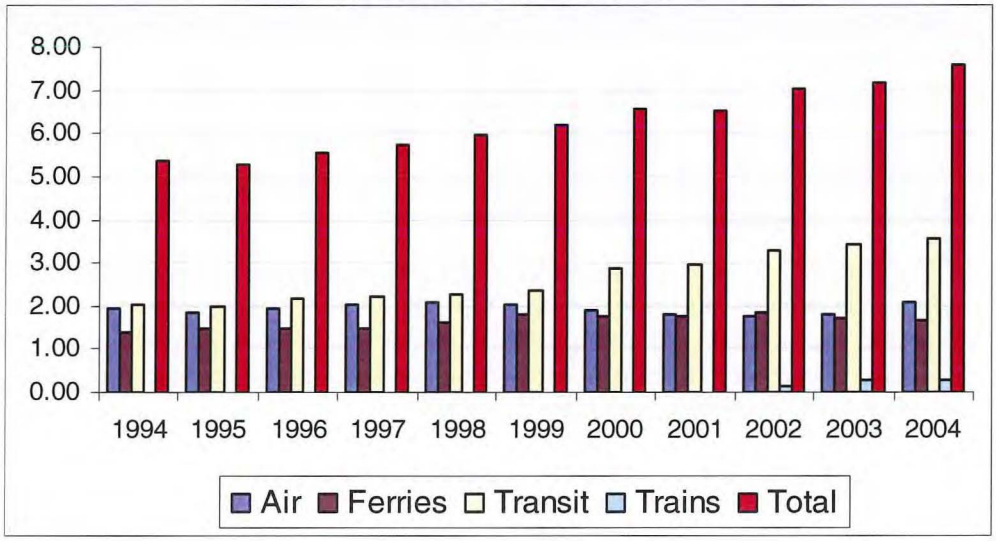
6.0 Passenger Transportation

6.0 Passenger Transportation

The focus of the MaineDOT Office of Passenger Transportation (OPT) is the movement of people by modes other than single occupancy vehicles which includes buses, trains, airplanes, ferries, vanpools, carpools, walking, and bicycling. MaineDOT plans passenger transportation initiatives and administers federal and state capital and/or operating programs for airports, ferry services, public fixed route and demand response services, passenger rail service, pedestrian and bicycling trails, park and ride facilities, and intermodal facilities. MaineDOT is also implementing *Explore Maine*, an integrated system of transportation options to move visitors into and throughout the state and to provide more travel choices to Maine's citizens.

From 1994 to 2004 ridership on ferries, trains, airplanes, and buses in Maine grew by more than two million riders, from 5.35 million to 7.60 million, a 42% increase. Airport use has rebounded since the September 11, 2001 terrorist attacks. Ridership on buses, rail, and ferries is expected to continue to increase as petroleum prices escalate.

6.1 Ridership in Millions



6.1 Transit

Transit is transportation by bus, passenger rail, or other conveyance, either publicly or privately owned, which provides general or special service to the public on a regular and continuing basis. Transit in Maine is provided by buses and vans in both urban and rural areas across the state. Transit service varies from running 7 days per week, 18 hours per day in the larger urban areas to running one day per week in the very rural areas. Service categories are:

- Fixed Route: Service on a fixed schedule with a fixed route.
- Demand Response: Door-to-door service by appointment, often limited to social service clients.
- Intercity: Between urban areas.

Transit operators and their subcontractors provide transit to most cities and towns in the state through grants and contracts. Many towns and cities throughout Maine receive regularly scheduled service three or more days per week. Many other towns receive service on a weekly basis or on a demand-response basis. Maine is unique in that its transit services in all the rural areas, and most of the urban areas, are run

on a 'community transit' model. This model focuses on providing transportation services which meet the transit needs of the entire community, including the needs of both the general public and special populations.

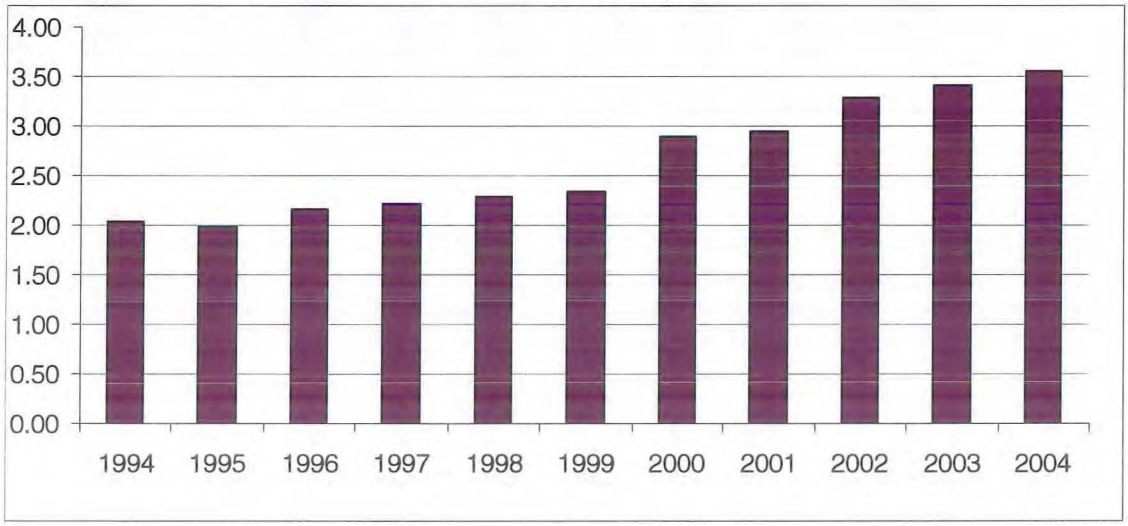
In addition to MaineDOT's public transit contracts, other services are purchased from the transit operators by the social service agencies. This enables a coordinated, seamless transit system that services more people more efficiently than separate systems operated by each social service agency.

New service is being implemented across Maine. In 2002, seasonal transit service in the Bethel ski region began limited operation that combined the diverse offerings of the town of Bethel with the major ski centers in the area. Skiing business interests have shown that bookings are reduced when transit is not a viable option. Other new services being offered include the *Island Explorer* on Mt. Desert Island, ZOOM commuter bus between Biddeford and Portland, FAST service (20 minute service on Forest Ave., Portland), free ridership for the Universities of Maine, Wheels to Access Vocation and Education (WAVE), extended Brewer service, and Rider's Choice employment transportation systems. The *Island Explorer* on Mount Desert Island has extended its season into October, expanded its routes and service frequency, and added vehicles to its fleet. Planning for local transit to complement rail service has been completed for Freeport and York County, where the Atlantic Shoreline will begin operating in 2006. Planning is underway for transit services in Brunswick and Carrabasset Valley. Expanded service and new, low floor, attractive buses make transit a more appealing alternative to driving for many travelers and commuters.

In addition, Maine is served by private intercity carriers. Cyr Transportation links Bangor and Northern Maine, West's Coastal Connections links Bangor and Downeast Maine, and Vermont Transit and Concord Trailways connect central, coastal, and southern Maine to Boston and points beyond.

Total ridership on transit systems serving Maine in 2004 is estimated to be 3.8 million. Transit has experienced steady increases in ridership over the last ten years. This reflects services being designed to meet changing market demands, such as seasonal service on Mount Desert Island; express service between Bangor, Portland, and Boston; free fares for university students; and job access programs. With increasing oil costs, this increased use of transit options is anticipated to continue.

6.2 Fixed Route Transit Ridership in Millions



6.0 Passenger Transportation

6.2 Airports

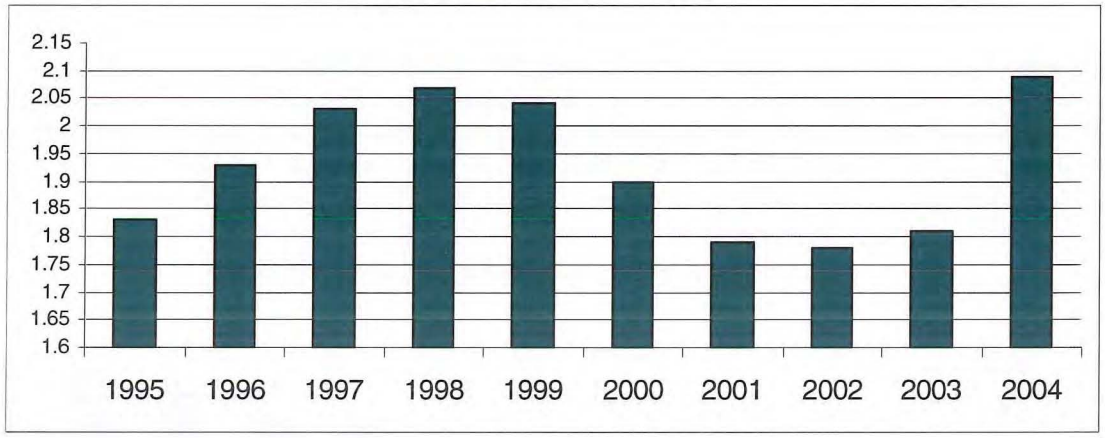
Maine has 148 landing sites, which include public and private airports, seaplane bases, and heliports. Of these, 66 landing sites are open to public use, with 36 (of the 66) municipally owned. These 36 make up the Maine State Airport System and are eligible to receive state and federal funding. They include the 6 airports with commercial air service.

6.3 Maine State Airport System

Commercial Service	General Aviation		
Portland	Auburn-Lewiston	Fryeburg	Norridgewock
Bangor	Belfast	Greenville	Oxford County
Augusta	Bethel	Houlton	Old Town
Knox County (Owl's Head)	Biddeford	Islesboro	Pittsfield
Presque Isle	Caribou	Jackman	Princeton
Hancock County - Bar Harbor	Deblois	Kingfield	Rangeley
	Dexter	Lincoln	Sanford
	Dover-Foxcroft	Lubec	Stonington
	Eastport	Machias	Waterville
	Frenchville	Millinocket	Wiscasset

Utilization of Maine's airports has increased in recent years, surpassing pre Sept. 11, 2001 levels. This reflects increased use of the Portland and Bangor airports.

6.4 Air Passengers in Millions



Pavement condition is an important measurement of an airport's ability to meet safety standards. Typically airport pavement is considered to have a 20 year lifespan. However, this can be extended by a variety of pavement maintenance activities, including overlays and surface treatment. The average age of the surface pavement in Maine is more than 14 years. MaineDOT has undertaken a statewide program to evaluate the condition of pavement at public airports. This program uses the Pavement Condition Index (PCI) to determine if the condition of the pavement is acceptable (70 or above) or not (below 70). Currently 87% of Maine's airports have a PCI of 70 or greater.

Another important measure is an airport's ability to meet demand, as measured by comparing utilization rates to runway capacity. All of Maine's airports are operating below 60% of their demand/capacity ratio and are adequate for the foreseeable future. However, The Portland Jetport's terminal and parking facilities are anticipated to require significant improvements to meet projected demand.

6.0 Passenger Transportation

6.3 Passenger Rail Service

In December 2001, Maine saw the return of passenger rail service with service between Portland and Boston. This service, the Downeaster, is provided by Amtrak, and utilizes a total of 114 miles of track:

- 42 miles of track in Maine from Portland to the New Hampshire border owned by Guilford Transportation Industries (GTI)
- 35 miles in New Hampshire owned by GTI
- 37 miles in Massachusetts, 1 mile owned by GTI, 36 miles owned by the Massachusetts Bay Transportation Authority (MBTA).

Ridership in 2002 reached projections for the first year of service. In the following three years ridership declined. In part this is due to trip time length, the limited number (4 round trips a day) of trips available and the current schedule which makes a daytrip to Portland difficult. Trip times recently were reduced and the Northern New England Passenger Rail Authority (NNEPRA) is working with the MaineDOT to make track improvements to support a fifth daily trip. It is projected that these improvements, combined with extending service to Brunswick, will double ridership. The Downeaster is recognized as having one of the best on time performance and one of the highest customer satisfaction ratings in the Amtrak system.

The State of Maine owns more than 300 miles of rail lines:

- Union Branch, Portland
- Rockland Branch, Brunswick to Rockland
- Calais Branch, Brewer to Calais
- Belfast & Moosehead Branch, Belfast to Unity
- Augusta Branch, Brunswick to Augusta
- Lewiston Lower Road, Brunswick to Lisbon.

By law, MaineDOT cannot operate a railroad and will look to the private sector to provide services on state-owned as well as privately held rail lines.

MaineDOT upgraded the state-owned Rockland Branch rail line from Brunswick to Rockland (56 miles) for passenger and freight use at a cost of approximately $30 million. In 2004 the Maine Eastern began limited seasonal excursion service on the Rockland Branch between Brunswick and Rockland. This service was expanded in 2005. Rail access to the historic Rockland station was restored in 2005 and work has begun on restoring the stations in Bath and Rockland. MaineDOT is working with the town of Brunswick to develop a passenger station.

A Draft Preliminary Environmental Assessment was prepared for upgrades for the Union Branch. MaineDOT will now begin the planning required for the Federal Transit Administration (FTA) New Starts program for the extension of passenger service from Portland to Brunswick, including commuter service between Yarmouth and downtown Portland.

6.5 Downeaster Ridership

2002	2003	2004	2005
164,620	262,692	260,296	250,535

6.0 Passenger Transportation

6.4 Ferries

Maine is served by a variety of public and private ferry services. The Maine State Ferry Service (MSFS) serves six year-round island communities: Matinicus, Vinalhaven, North Haven, Islesboro, Swans Island, and Frenchboro. Service frequencies vary from nine trips daily to Islesboro to 27 trips a year for Matinicus.

6.6 Maine State Ferry Service Vessels

Name	Year Built	Passenger Capacity/Seating	Car Capacity	Service
North Haven *	1959	125/26	9	Matinicus
Everett Libby **	1960	175/50	12	Spare/Matinicus
Gov. Curtis	1968	225/62	17	Vinalhaven
Margaret Chase Smith	1987	226/176	30	Islesboro
Capt. Henry Lee	1992	225/60	17	Swans Island and Frenchboro
Capt. Charles Philbrook	1993	225/60	17	Vinalhaven
Capt. Neal Burgess	1993	225/60	17	North Haven

** In limited service.*

*** Backs up any vessels that are not in service & serves Matinicus when traffic exceeds M/V North Haven's capacity.*

The MaineDOT has two pending MSFS projects which are currently in the final stages of planning/funding. The projects are: 1) New Ferry to replace the *Gov. Curtis*, at a cost of $7 million. The *Gov. Curtis* would then become the primary spare/backup ferry. 2) Completion of Phase II of the Rockland Terminal/Wharf project. Other key projects (in order of priority) which require planning/funding are:

- Replacement of the Swans Island Ferry Pen,
- Replacement of the Lincolnville Transfer Bridge,
- Replacement of the Islesboro Transfer Bridge,
- Re-power *Gov. Curtis* with low emissions engines,
- Re-power *Everett Libby* with low emissions engines,
- Re-power *Margaret Chase Smith* with low emissions engines,
- Construct new terminal building on Swan's Island,
- Replace or re-model Islesboro crew's quarters.

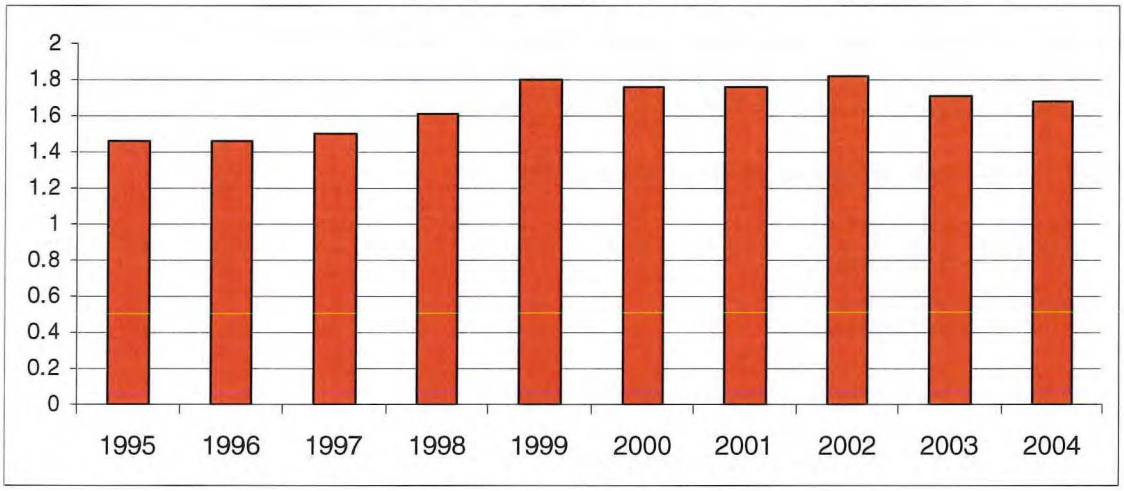
Other ferry services in Maine include:

- Casco Bay Island Transit, (CBITD) linking Peaks, Great Diamond, Little Diamond, Long, Cliff, and Chebeague Islands to Portland.

- Chebeague Island Transportation, linking Chebeague Island in Cumberland to Cousins Island in Yarmouth.
- The CAT, seasonal service between Bar Harbor and Nova Scotia.
- Numerous privately owned seasonal services to island communities.

The MaineDOT supports CBITD with capital and operating funds and has assisted Cumberland in securing mainland access for Chebeague Island Transportation.

6.7 Ferry Ridership in Millions



6.5 Commuter Programs

GO MAINE Commuter Connections is administered by the Maine Department of Transportation and the Maine Turnpike Authority, and operated by the Greater Portland Council of Governments. MaineDOT provides $350,000 and Maine Turnpike provides $230,000 in funding biennially. Private employers provide additional support through in-kind contributions.

The initial vanpool program for state employees began in 1982. In 2001, MaineDOT and the Maine Turnpike expanded commuter services statewide by creating a new statewide commuter program, GO MAINE Commuter Connections.

GO MAINE Statistical Overview

- 2,684 commuters are registered in the statewide database
- 509 total carpool participants
- 10 GO MAINE vanpools currently in operation
- 12 privately owned and operated vanpools registered with GO MAINE
- 173 total vanpool riders

Employer Outreach

- More than 900 employers are registered in GO MAINE database.
- More than 1,000 employers were reached through on-site exhibits at Maine Human Resources Conventions and other employer exhibits in 2003-04.
- 15,000 employers are reached annually through ongoing direct marketing campaigns (includes Commute Another Way Day).

6.0 Passenger Transportation

Updated Commuter Benefits Package

In May 2004, a new State Employee Preferential Parking Program began that allows participating carpoolers, vanpoolers and hybrid vehicle drivers to get preferential parking near their workplace. Carpoolers must carpool at least 3 times a week and be registered with GO MAINE to be eligible for Preferential Parking.

In February 2005, a new Pre-tax Benefit Program was implemented for State Employees commuting to and from work riding GO MAINE vanpools. This transportation benefit is helping state employees who are vanpool participants save a significant amount of money annually on their commuting costs. The benefit allows participants to pay for a portion or all of their monthly vanpool fare with *pre-tax dollars*. This means a significant savings on Federal and State taxes.

Existing GO MAINE Managed Vanpool Routes (10)

1. Portland to Augusta (5)
2. Lewiston to Augusta (2)
3. Brunswick to Augusta (2)
4. Falmouth to Augusta (1)

Existing Private Vanpools Registered with GO MAINE (12)

1. Waterville to Bath- Bath Iron Works (BIW)
2. Kennebunkport to Kittery/Portsmouth Navel Shipyard (PNS)
3. Biddeford-Saco to Kittery/PNS
4. Biddeford to Kittery/PNS
5. Waterville-Augusta-Gardiner to Bath/BIW
6. Biddeford to Bath-BIW (2)
7. Westbrook to Bath-BIW
8. Augusta-Gardiner to Bath-BIW
9. Eliot to Boston MA
10. Kennebunk to Kittery/PNS
11. Gray to Bath/BIW

Proposed New Vanpool Routes

By 2008, GO MAINE will be expanding the vanpool program by adding approximately twelve new routes. Fifteen new vanpool routes serving a wide geographic area are possible based on MPO recommendations, transportation studies, demonstrated commuter demand and anecdotal evidence.

1. Lewiston to Portland
2. Portland to Lewiston
3. Portland to Brunswick/Topsham
4. Brunswick/Topsham to Portland
5. Portland to Augusta
6. Lakes Region to Portland
7. Wells to Greater Boston MA
8. Bangor to Waterville/Augusta
9. Millinocket to Bangor
10. Pittsfield to Bangor
11. Belfast to Bangor
12. Ellsworth to Bangor

13. Dover-Foxcroft to Bangor
14. Rockland/Mid-Coast to Augusta
15. Major employers (e.g. Jackson Lab)

Park and Ride

MaineDOT and the Maine Turnpike Authority (MTA) also develop and maintain park-and-ride facilities throughout the state. Park-and-ride lots provide a safe place for commuters to leave their cars for transfers to another mode for the rest of their trip. These park-and-ride lots, which provide more than 2,000 parking spaces for commuters, are owned by the state, Maine Turnpike Authority, local communities, or private entities. They are located at interstate exchanges, on state and municipally owned property, at churches and shopping centers, and on private property.

6.6 Bicycle/Pedestrian Network

MaineDOT contributes to increased bicycle and pedestrian mobility by constructing paved shoulders, bike lanes, and/or sidewalks along or within state highways, local streets, and roads, as well as through the construction of shared-use paths. MaineDOT includes bicycling and pedestrian improvements, where appropriate, within all transportation projects. In addition, the Transportation Enhancement (TE) and Safe Routes to School Programs provide funding to municipalities to improve bicycle and pedestrian access and provide safer routes for walking and biking to school.

The TE Program is a federal/municipal match program (typically 80/20) offering a funding opportunity to help communities revitalize their economies by expanding their transportation and livability choices. Maine's use of this program principally supports enhancements in connection with MaineDOT's *Explore Maine*, and with pedestrian & bicycle, environmental mitigation, and downtown revitalization initiatives that create a more effective transportation system focused on the community. TE projects can include creation of bicycle and pedestrian facilities, streetscape improvements, refurbishment of historic transportation facilities, and other investments that enhance communities and access. The federal government provides funding for TE projects through our nation's surface transportation legislation.

The need for improvements statewide far exceeds available funding. For the 2006-07 funding cycle, municipal requests totaled $14 million, compared to $5 million in available funding.

Sidewalks are a basic element of an urban pedestrian network. Without them, many people are reluctant to walk along the side of the road. Many municipalities have serious gaps in their sidewalk networks, a situation that impedes pedestrian access. In addition, only a small percentage of Maine's sidewalks meet the Americans with Disabilities Act (ADA) guidelines regarding accessibility for people with disabilities. Sidewalk construction and maintenance is primarily the responsibility of local municipalities, although MaineDOT provides some funding for new sidewalk construction through its Program and the Safe Routes to Schools Program. MaineDOT also replaces and constructs new sidewalks, where appropriate, as part of its highway improvement projects.

Paved shoulders are essential to bicycle access and safety on rural roads, as well as for driver and pedestrian safety and for maintenance on most streets and highways. Without paved shoulders, many people are reluctant to bicycle. MaineDOT's Shoulder Surface Policy, established in January 2000, is helping to create more miles of paved shoulders. This policy will convert gravel to paved shoulders for reconstruction or pavement preservation projects on all arterials and on most major collectors. For the last few years, about 125 miles per year of gravel shoulders have been converted to paved shoulders. However, there are significant deficits in the paved shoulder network and it may be decades before all major collectors are built to current standards.

Although there are few miles of bike lanes presently in Maine, they are appropriate on urban streets where adequate width exists. Bike lanes are important in increasing urban bicycling because they provide a greater degree of comfort and safety to the bicyclist. Because bike lanes are primarily located in urban areas, it is primarily the responsibility of the metropolitan planning organization or the local municipality to fund and install them. Bike lanes have been added to many miles of streets in Portland and have begun on a limited basis in Auburn.

Shared use paths have significantly increased bicycle and pedestrian use and access where constructed because many users desire facilities completely separated from the highway system. These paths provide increased opportunity for walking, bicycling, and other activities away from roads and traffic, and provide additional transportation choices where located. There are currently short stretches of shared use path in a few Maine communities, totaling approximately seventy five miles throughout the state. While the demand for shared use paths is quite high, their implementation has taken many years primarily due to limited funding and the need for local management agreements.

6.6.1 Maine's Three Long Distance Shared Use Trail Efforts

- Mountain Division, 45 miles, Westbrook to Fryeburg
- Downeast Trail, 87 miles, Ellsworth to Ayers Junction
- Eastern Trail, 55 miles, Kittery to South Portland

Nearly six miles of trail have been constructed for the Mountain Division and the first three miles have been built for the Eastern Trail. There are plans to start or continue construction on all three trail systems as funding allows.

MaineDOT works very closely with bicycling, walking, and trail groups, as well as organizations promoting healthy communities, to help create the local support necessary for improving bicycling and walking opportunities statewide. The Maine Eastern Trail Alliance, East Coast Greenway Alliance, The Mountain Division Alliance, and The Sunrise Trail Coalition, are examples of organized groups that MaineDOT works in coordination with to move projects forward.

When a shared use trail is constructed it is the responsibility of the local municipalities and user groups to maintain the facility. As longer distance trails are developed through more rural areas of the state, there may be a need for state investment for maintenance.

In addition to the regional groups, many local groups promote improved bicycle and walking facilities in the state. Portland Trails has completed 28 miles of shared use trails in Portland since its inception in the late 1980's. Another successful local effort has been the Friends of the Kennebec River Rail Trail, which is leading the way in planning and implementing a 6.5 mile path linking Gardiner, Farmingdale, Hallowell, and Augusta. Sections of the trail have been completed and planning for the remaining section is on-going.

6.7 Intermodal Facilities

Intermodal facilities link two or more modes of passenger or freight transportation. MaineDOT, in partnership with Concord Trailways, has developed an intermodal passenger facility at Sewall Street in Portland. This facility, developed through a public-private partnership, services METRO, local shuttles service, taxis, Concord Trailways intercity buses, and the *Downeaster* Portland to Boston Amtrak service. Concord Trailways, MaineDOT, and the Northern New England Passenger Rail Authority shared the $2.3 million cost for this facility.

6.0 Passenger Transportation

Intermodal passenger facilities are planned at or near the airports in Auburn and Trenton. These facilities will provide park and ride lots and access to air, motor coaches, and passenger services. The Trenton facility is being planned to include a new welcome center for Acadia National Park and Downeast Maine. These facilities will include income-generating rental space to help defray operating costs of the facility and transit services.

6.8 Funding Scenarios and Implications

6.8.1 Transit Funding

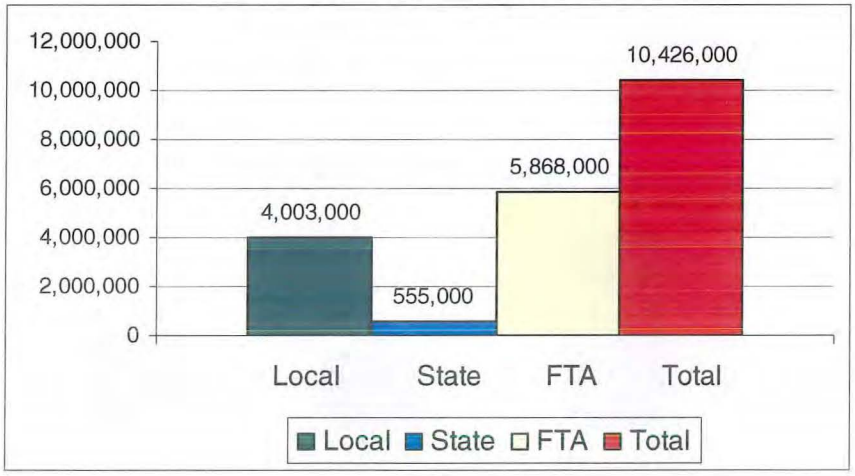
Since the second half of the 20th century, most passenger transportation services have required operating subsidies. On average, fare box revenues cover only 25% of the operating costs for public transit services. Sources of these subsidies include the FTA, state funds, and local municipalities. Federal and state funds are limited, increasing the dependence on local property tax revenues.

OPT oversees FTA formula transit programs for Maine. These are categorized as:

- Urban programs
- Rural programs
- Job Access Reverse Commute
- Tribal
- Elderly & Disabled
- New Freedoms
- Planning

The FTA allocates these funds by formula and identifies annual funding levels for five years. The majority of these funds are used for operating support. Federal funds can only be used to cover up to 50% of operating deficiencies. Maine annually receives almost $6 million in FTA program funds. This will increase to $10 million in 2006. This is matched with $555,000 in State Funds. The remaining funds must be raised through the local municipalities. As operating costs have risen, the burden on the local communities has grown and is a continuing challenge for municipalities in Maine.

6.8 FY 2005 Operating Assistance



6.0 Passenger Transportation

To help relieve the burden on municipalities, Maine instituted a Bonus Program in 2003 to encourage increases in contributions from municipalities. Any municipality which increases their contribution to fixed route transit is eligible to receive an increased amount in the funds they receive from MaineDOT for local roads.

Funding for new or expanded services is a concern. With the return of rail service and the success of the *Island Explorer,* many communities wish to expand or start seasonal or year-round services. The primary federal support for new programs is limited to three years of operating assistance, leaving the municipalities to cover the shortfall with local dollars or discontinue service when the federal funds run out. The *Island Explorer* on Mt. Desert Island is perhaps the most dramatic example of the ending of federal funds after a highly successful three-year start-up. Currently, sources of operating assistance are FTA 28%, local towns 13%, local business organizations 8%, local conservation organizations 8%, and the National Park Service 43%. A sustainable funding source was established utilizing special National Park entrance fees and FTA rural funds. The *Mountain Explorer*, a seasonal service connecting the ski areas with local towns operates with the majority of funding coming from local businesses and towns. This type of innovation promotes economic development and protects our environment.

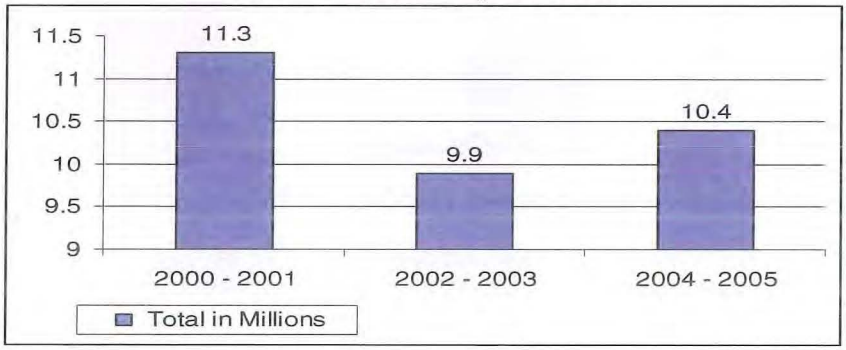
MaineDOT recently concluded an evaluation of unmet general public transit needs in Maine. This *Transit Needs Study* identified the need for $660,000 in additional operating funds annually and $250,000 in start up funds to implement new services to support coordinated transit and Job Access/Reverse Commute programs. The study did not address increasing funding for social service transportation demands.

Capital

Maine relies heavily on FTA funds for vehicle replacement and operational investments. The state occasionally receives additional federal capital funds on an earmark-only (money for specific projects) basis. Bond funds, as well as local funds, are used to match these federal funds.

Maine and the FTA, along with the local providers, have purchased and are operating 330 vehicles, ranging in size from minivans to full size transit buses. Maine has made great strides in updating its fleet of transit vehicles to a fleet that is modern and marketable. 70% of the vehicles are in the first half of federally established 'useful' life. The major investments now are directed toward continuing this upgrade and switching the Portland METRO fleet to clean and domestically secure CNG fuel and continuing to expand the *Island Explorer* propane fleet. This will take approximately $15 million over the next five years to fully implement. Additional capital funds will be required to replace and build transit facilities, intermodal centers, bus garages, and other support facilities as well as for increased operational support.

6.9 FTA Transit Capital Funds



6.0 Passenger Transportation

To maintain current levels of service and performance $31 million per biennium is needed to meet capital and operating needs. This provides operating assistance and replacement of vehicles. An additional $5.3 million is needed to develop new services recognized in the 2002 *Analysis of Transit Provision in Maine.*

If funding were to remain at current levels, the dependence on local operating support would continue. Our ability to implement new programs to meet changing market demands and federal mandates would be limited.

A 20% increase in funding would support the expansion of services to meet identified local and regional needs, conversion to clean fuel vehicles, and to meet new federal mandates such as United We Ride. In addition, it could be used to help reduce the level of local operating funding needed.

A reduction in funding would hamper efforts to reduce congestion and promote connectivity for tourists. Also it would further shift the operating burden to municipalities and could result in curtailment of services.

6.8.2 Airport Funding

The federal funding programs provide funding to airports under Federal Aviation Administration (FAA) guidelines and priority systems. The commercial service and general aviation airports in the Maine State Airport System receive an annual entitlement totaling approximately $10 million. The federal program currently is a 95/5 program, requiring a 5% combined state and local match. The state share has historically come from bonds. This will return to a 90/10 program in 2008.

In addition to federal programs, the State had two programs paid for with bond funds:

- Runway pavement management program
- Obstruction removal program

There is no funding for these programs in the upcoming bond.

Over the past 6 years, Maine's airports received approximately $80 million in state and federal funds for capital costs.
Runway, taxiway, and apron rehabilitation and maintenance are the largest portion of the investments made in Maine's airports and draw the largest amount of federal funds. However, due to limited funding, pavement overlays have been done as a holding action in lieu of pavement reconstruction. Additional funding will be needed within 8 years (average lifespan of an overlay), to address the imminent need for many pavement reconstruction projects. Another indicator of the future need for extensive pavement investments is the fact that the State preventative maintenance program is unfunded, leaving crack sealing projects and other preventative projects undone. This will substantially shorten the lifespan of all airport pavements.
Obstructions to the runway approaches are a serious safety problem and limit access by air throughout the State. To assist in removing obstructions, MaineDOT has developed Vegetation Management Plan minimum standards, and many airports have completed these plans and have begun the recommended obstruction removal projects. Unfortunately, this state program is currently unfunded, limiting our airports' ability to compete for new, high technology approach systems.

Maintaining the current level of funding (status quo) will not be adequate to maintain current service and maintenance schedules. The commercial service airports are continuously initiating new projects to maintain safety, security, and level of service. Current federal funding allows the commercial service

airports' safety projects to be completed first, while safety-related projects at the municipal airports queue for remaining funds. Previously, state funding programs assisted these municipal airports in meeting basic requirements and safety needs.

Increasing funding by 20% would allow us to restore programs to assist general aviation municipal airports by investing in pavement management, obstruction removal, and airport improvements and repairs.

If funding was cut 20%, pavement deterioration will escalate, approaches would continue to be compromised, and growth would cease. Future funding need is already rising due to the higher expense of replacement as opposed to scheduled maintenance.

To maintain current levels of service and performance, $33 million is needed biennially to meet capital needs. An additional $44.2 million is needed to address identified strategic needs such as runway expansions, removal of obstructions, improved navigational aids, security, and terminal improvements.

6.8.3 Passenger Rail Service Funding

Operating

The stability of the Boston to Portland service is a concern. Congestion Mitigation Air Quality (CMAQ) funds were used to cover operating costs above farebox income for the first three years of service. Now Surface Transportation Program funds are being utilized. Reauthorization of the US DOT Transportation Bill includes extending the use of CMAQ funds through 2008. Funding after that remains a concern. MaineDOT estimates 2009 revenues to be $4.3 million and operating costs $12 million, with a shortfall of $7.7 million. By 2015 the shortfall will be $ 8.8 million. A Governor's Task Force has been appointed to look at funding mechanisms for passenger rail service.

Once funding has been stabilized for the core Boston to Portland service, funding for new, expanded services north of Portland will need to be secured. Commuter service into Portland can play an important role in reducing congestion in I-295 and Route One corridors.

Capital

There is no current state "program" budget for passenger rail development. The next priority is the estimated $63 million upgrade of the tracks between Portland and Brunswick (27 miles) for passenger use. This includes upgrade and realignment of the Union Branch in Portland and construction of a new trestle across Back Bay. This rail connection will use a combination of state-owned, Guilford, and Saint Lawrence and Atlantic right-of-ways. When complete, this "core system," Portland to Boston and Portland to Rockland, will comprise approximately 140 miles of track in Maine, with approximately half in public ownership. MaineDOT is pursuing FTA New Starts funding for the necessary capital needs.

Even with status quo funding, the operating deficit after CMAQ eligibility will need to be addressed. A 20% reduction in funding would result in delayed maintenance, lower train speeds, and declining ridership and would jeopardize the service. A 20% increase in funding would help cover shortfalls or cover the proposed fifth daily round trip between Portland and Boston, which would attract an additional 56,000 riders and increase revenues by $877,000 in the first full year of service.

6.0 Passenger Transportation

In the last three biennia, adequate levels of capital and operating funding have been available to maintain constant performance. In 2009 the Portland to Boston service will no longer qualify for CMAQ funding. This will require $5.7 million in operating funding.

A stable, long term source of operating funding is necessary for continued passenger rail service in Maine. A Governor's Task Force will address this issue in the fall of 2005.

6.8.4 Ferries Funding

In the last biennial budget cycle (FY2004-05) the MSFS experienced increased costs in three areas:

- Additional personnel cost due to Marine Security Regulations
- Steep increase in fuel costs
- Increase in the costs of all goods and services

These increases made it difficult to provide scheduled service while covering operating costs of $6.3 million. FY2005 revenues ($3.4 million) and state operating assistance ($2.4 million) were minimal to cover operating costs and to maintain the fleet of ferries. Proper maintenance, in the long run, will prolong the life of vessels and other infrastructure, which should reduce the need for more costly replacement projects. The current preventative maintenance budget is modest at $500,000 annually.

Over the next six years the pens and transfer bridges in Rockland and Lincolnville/ Islesboro need to be replaced, along with the pens on Swans Island, at an estimated cost of $15 million. In the next 15 years, existing vessels must be scheduled for replacement (in addition to *Gov. Curtis)* at an estimated cost of $30 million in today's dollars. Funding for these projects has not been secured.
Funding in the future must keep pace with inflation and fuel costs in order to maintain current levels of service and basic maintenance schedules. As the fleet of ferries ages the annual maintenance budgets will need to increase.

A 20% increase in funding would assist in completing needed preventative maintenance on the vessels and support vessel refurbishment which would increase their service life, reduce the possibility of catastrophic engine failure, and improve fuel efficiently.

If funding were cut 20%, maintenance of vessels and facilities would again be deferred. This would be very costly in the long run, as unanticipated breakdowns would increase, the overall costs would rise due to engine and other serious mechanical failures, and the overall service life would be shortened.
With no expansion of services planned, current funding levels support the provision of services by the MSFS. An additional $10.6 million is needed to replace the Governor Curtis and the pen at Swans Island, and for an additional berthing pen in Rockland.

6.8.5 Vanpool/Carpools/Park and Ride Lot Funding

MaineDOT is currently expanding the Portland and Augusta rideshare programs with a budget of $350,000 per year. This amount is adequate to incrementally expand the program statewide. $1.5 million is needed to build new park and ride lots and expand the van fleet.

6.8.6 Bicycle/Pedestrian Network Funding

Improvements to the bicycle/pedestrian network are funded through two primary sources federal programs Transportation Enhancement funds and Surface Transportation Program funds, as well as state bond and local funding. The Transportation Enhancement program is a federal program of which bicycle/pedestrian facilities are an eligible category. These funds have been used to construct most of the

shared use paths in Maine and a few municipal bike lane and sidewalk projects. At current funding levels, about $2.5 million/year is invested in bicycle/pedestrian projects.

The Safe Routes to School Program in Maine was recently awarded $1 million per year for the next 5 years from the federal 2005 SAFETEA-LU Transportation Bill.
The estimated cost to complete the three trails of statewide significance (Mountain Division, Downeast, and Eastern Trails) is over $70 million. Since some of the Enhancement funds go toward municipal projects, these trails could take between 35 to 70 years to complete. Any decreases in funding would lengthen this time frame or reduce funding to improve bicycling and walking facilities in local municipalities.

There is no funding program specifically for Bicycle and Pedestrian facilities. Enhancement funds have been adequate to support the program. However, if MaineDOT is to develop the three planned regional trails, $9.5 million in capital funding over 6 years will be needed.

6.8.7 Intermodal Facility Funding

The two intermodal facilities planned at Auburn and Trenton will cost approximately $10 to $15 million each. To date $7 million has been secured for the Trenton facility. These facilities are expected to have income-generating potential to assist with operating and maintenance costs. Planning and developing intermodal facilities is a lengthy process, resulting in varying levels of investments over the last three biennia. An additional $7 million is needed for the Trenton Intermodal facility.

6.9 Conclusions

6.10 Maine's Passenger Transportation System Needs (in millions of 2005 dollars)

Passenger Transportation	2002-2003	2004-2005	2006-2007	STATUS QUO Investment Level (Average Over 3 Biennia)	To Maintain Constant Performance/ Condition	Biennial Strategic Need
Transit	26.7	37.8	39.6	34.7	31.0	40.0
Airports	43.3	39.5	32.7	38.5	33.0	44.2
Passenger Rail Service	15.2	22.9	9.5	15.9	15.0	50.0
Ferries	17.5	12.8	3.7	11.3	10.6	10.6
Commuter Programs	1.0	0.9	1.0	1.0	0.5	1.5
Bicycle/Pedestrian	7.4	10.6	9.1	9.0	1.0	10.0
Intermodal Facilities	9.8	0.0	2.0	3.9	1.0	6.9
Total:	**120.9**	**124.4**	**97.6**	**114.3**	**92.1**	**163.2**

New federal regulations require better coordination of transportation for human services clients. To meet these requirements we need to foster better cooperation among state agencies providing transportation. Support from the executive level is necessary to bring all state agencies to the table.

6.0 Passenger Transportation

Passenger transportation is vital to addressing mobility needs of Maine's citizens and to address highway congestion. While State and Federal funds have been adequate to meet capital needs, ongoing operating funds remain a concern for transit providers. Maine must develop sustainable operating funding sources for passenger transportation to ensure the continuation of services.

Advanced Traveler Information (ATI) is critical to transportation demand management. MaineDOT needs to continue to invest in technology to provide travelers with timely information on travel alternatives, congestion, weather, etc. Better promotion of our available ATI programs is also needed.

7.0 Freight Transportation

7.0 Freight Transportation

MaineDOT recognizes the increasingly important role of freight transportation in the management and growth of Maine's overall transportation infrastructure and in the promotion of Maine's economic vitality. MaineDOT, through its Office of Freight Transportation (OFT), has made consideration and advancement of freight improvement projects a priority. OFT has been guided in this effort by two previous Integrated Freight Plans. Also, OFT is currently working with the Volpe Transportation Center of Cambridge, MA on a security project to better track freight flow into, within, and out of Maine.

7.1 Cargo Ports

The state's major investments in cargo port assets include the following:

Eastport – the Estes Head Cargo Pier and warehouses are currently in excellent condition and operating at below design capacity.

Searsport – the Mack Point Dry Cargo Pier is in excellent condition and operating at below design capacity, although interest in developments at the Mack Point facility are increasing at an aggressive pace, and it is likely that this facility may exceed its design capacity within the next decade. The Sears Island property is undeveloped at this time.

Portland – the International Marine Terminal is in fair condition and is currently operating below design capacity. However, new uses have been identified that will require an expansion and renovation. Also, recent interest in a new container feeder service to the Port of New York & New Jersey could dramatically increase the use of this facility, which could result in a need for upgrading the facility.

7.2 Freight Rail

Freight railroads are classified by the Federal Rail Administration based on annual operating revenue as follows:

- **CLASS I** - Annual revenues of greater than $258.5 million
- **CLASS II** - Annual revenues between $40 million and $258.5 million
- **CLASS III** - Annual revenues of less than $40 million.

Maine has no Class I service, but its Class II carriers connect with four Class I railroads in New York, Montreal, and St. Leonard, N.B. The state's Class II railroads, Montreal Maine & Atlantic (MMA), GTI, and St. Lawrence & Atlantic Railroad (SLA), form the core of Maine's regional rail system. The Maine Eastern Railroad is a regional railroad operating on the recently rehabilitated Rockland branch. These four railroad companies move more than 8 million tons of freight per year over 1,200 miles of active track. Maine has roughly 230 miles of inactive track. There are two operating rail/truck intermodal facilities, located in Auburn and Presque Isle.

The Auburn facility is served by SLA via its connection to Class I railroad Canadian National. Canadian National's merger with the Illinois Central, along with newly developed partnerships with KCS and Tex-Mex, has opened Maine rail markets to new opportunities that SLA is actively marketing. Additional opportunity for growth has occurred through the development of Mini-Landbridge (MLB) traffic from the Pacific Rim via the port of Vancouver. Mini-Landbridge is generally defined as traffic received over a Pacific coast port with a destination on the U.S. east coast. The SLA is fully cleared for two high cube double-stacked containers between Auburn and Montreal and has Customs clearance on-site. This facility has high traffic levels.

7.0 Freight Transportation

The Presque Isle facility is served by MMA, utilizing two intermodal routes: North-South and East-West. Currently, the North-South traffic is moving via MMA to Northern Maine Junction, via Guilford to Ayer, MA. The east-west traffic moves from Bangor to Montreal. However, this facility has intermittent low traffic levels.

The East-West service is primarily dictated by ship arrivals and departures at the Canadian ports of St. John (primarily) and Halifax and Montreal. This line is cleared for double-stack operation. The MMA also moves traffic west to Montréal from Searsport.

Currently, the Maine freight rail system is in transition. The MMA bought the assets of the former Bangor & Aroostook Railroad in 2002, and is working to restore service levels and attract new customers. It has reestablished service levels at Searsport. SLA Railroad's parent company, Emons Holdings, Inc., was acquired by Genesee & Wyoming, Inc., a short-line railroad holding company with assets in five countries. Its new operation has been beneficial to shippers. GTI continues to serve its customers in Southern and Central Maine. Maine Eastern Railroad, owned by Morristown and Erie Railroad, operates the state owned Rockland Branch from Brunswick to Rockland.

7.3 Motor Carrier

Motor carrier related projects have emphasized both enhancement of truck freight flow safety and efficiency. Major motor carrier-related "assets" which have involved OFT include:

1) A Heavy Haul Truck Network that has identified major truck freight routes in Maine and provided criteria for evaluating projects that may improve freight flow by truck. An associated program provides project selection criteria for projects that enhance truck freight flow. This program is designed to allow more efficient prioritization of heavy truck related projects in the planning process. The program needs updating to allow it to better utilize MaineDOT data that reflect actual highway conditions.

2) A public-private partnership project to build an overnight parking area for truck drivers. OFT is working cooperatively with a southern Maine truck stop operator to expand overnight truck parking at the truck stop. A recent MaineDOT study found that there was a deficit of overnight truck parking places in the southern third of the state. This project will provide more rest opportunities for truckers and combat the "tired trucker" problem.

3) An interactive motor carrier data base system installed at the BMV for use by State Police enforcement in the field.

4) A future installation of vehicle screening systems at the I-95 Kittery-York weigh stations.

5) Future enhancement of the data base system used by the Bureau of Motor Vehicles and the Maine State Police to allow one screen access to national motor carrier enforcement data bases.

7.4 Air Freight

Air freight is an important component of Maine's current freight transportation system and is experiencing rapid growth (7.0 to 10 percent annually). Air freight is especially important for the transportation of low-weight/high-value commodities, such as semiconductors, and of perishable commodities, such as seafood.

7.0 Freight Transportation

The Portland Jetport is situated on 700 acres, three miles from downtown Portland. Both FedEx and DHL operate freight facilities at the airport. A package of improvement projects, including runway improvements and the construction of new freight facilities near the airport's access road to streamline mail and cargo operations, was recently completed. Its air freight operations however are limited by neighborhood concerns.

The Bangor International Airport, located along I-95, operates one of the longest runways (over 11,000 feet) in the Eastern U.S. The airport also has over 30,000 square feet of warehouse space. It is operating well below capacity.

The Auburn-Municipal Airport is a small airport that handles corporate, charter, recreational, and cargo activates. Its air freight activities are located near the Industrial Airpark, which is located in close proximity, not only to I-95, but also to the Auburn-Lewiston Intermodal Facility. It has made new improvements and is operating below capacity.

With the BRAC Commission's formal closing of the Brunswick Naval Air Station, this facility may become available for air freight operations.

7.5 Funding Scenarios & Implications

For the three biennia beginning October 2002, the OFT budgeted work plans averaged $8.1 million per biennium (including both bond and federal funds). This represents an estimated "status quo" funding level for freight investments. The effect of possible funding scenarios of status quo, 20% increase or 20% decrease in funding for the period ending in 2013 and beyond is discussed by mode as follows:

Ports

If funding of commercial ports is maintained at the current level, with only an increase for inflation, there will be insufficient funding to cover needed expansion and development. Status quo funding would cover general maintenance and upkeep of existing facilities. However, until the last two decades, investment in Maine's public port facilities had been severely neglected for close to a century. This has placed Maine at a considerable disadvantage in being able to provide cost-effective access to international transportation options for its manufacturers. International trade, and consequently international shipping, is experiencing aggressive rates of growth. Additionally, with the ever increasing costs of overland domestic cargo movements the re-emergence of coastal shipping lanes is imminent. For Maine to compete, or more appropriately, for Maine to provide the marine transportation infrastructure that will allow the state's businesses to compete, will require a significant increase in funding for public port facilities, and increased creativity in applying the funding.

Status quo funding for cargo ports based upon historic investment averages, or even a 20% increase over that funding level, will not be sufficient to meet the needs of port development. To truly maintain our position relative to international cargo shipping will require at least $50 million in investments over the next decade. Looking forward on a 20 year horizon there will be a need for an additional $200 million in port investments to keep pace with the growth of international trade and shipping needs.

A 20% reduction in funding would essentially cripple the state's ability to provide adequate development of new port facilities to meet the needs of businesses. This would negatively impact the state's ability to retain existing manufacturing and traditional forest product industries. It will also impose significant disadvantages to economic development and attracting new business to the state.

7.0 Freight Transportation

Motor Carrier

If funding of motor carrier programs is maintained at the current level, with an increase for inflation, there should be sufficient funding to cover needed database enhancements to Unified Motor Carrier Account Management System (UMCAMS) and the Heavy Haul Truck Network (HHTN), and to fund very modest extensions of the vehicle screening system to other locations. This level of funding would maintain constant performance respecting motor carrier needs of OFT. There would probably not be sufficient funding to increase the number of weigh areas or public-private truck rest areas on the Interstate system. An increase in motor carrier program funding of 20% would not satisfy Strategic Needs, which would require more extensive improvements in vehicle screening and credential monitoring. An increase in funding of almost 100% over Status Quo Investment would be required to meet these needs. However, it is anticipated that federal CVISN funds will be available to fund at least some of these needs.

A 20% reduction of funding from current levels would prevent further enhancement of UMCAMS and preclude any development of additional weigh areas, truck rest stops, vehicle screening sites, and freight flow tracking capabilities. The State would be unable to complete requirements for CVISN core capabilities in electronic commercial vehicle enforcement and be ineligible for federal funding in this area. This would negatively impact motor carrier loading and safety practices and planning and enforcement capabilities, resulting in increased bridge and pavement wear, reduced highway safety, and less efficient motor carrier freight flow.

Rail Freight

Currently 92% of Maine's active track will not support a 286,000 pound rail car, which is quickly becoming the rail industry standard. Installation of the 132 lb. rail needed to support the heavier car over Maine's 1,200-mile system is a capital investment that the Class II carriers cannot undertake alone. It is estimated the cost for acquisition and installation of heavier track is approximately $208,000 per mile. With this improvement, Maine's rail operators have the ability to move the new generation of freight cars and locomotives. Without investment in the heavier track, some rail traffic may be lost to trucks, increasing highway damage and maintenance costs, as well as increasing congestion and air pollution.

Increasing investments should be made in the State rail infrastructure. Though the state's rail system has benefited from the recent major investments in mainline track and sidings through the Industrial Rail Access Program (IRAP), increased funding will help protect the public interest in rail operations in the State and fully take care of the backlog of IRAP projects. This will create new traffic and job opportunities, and maintain state-owned track and connections to national Class I carriers. IRAP is a successful and popular program, but it is currently unfunded. The funding need for IRAP is approximately $1 million per year for 5 projects. Additional funding is also needed to rebuild major interchange yards at our regional railroads. Maine has three locations where capacity exists to move Intermodal freight to rail: Auburn, Presque Isle, and Waterville.

A 20% cut or any cut in rail freight funding would reduce MaineDOT's ability to maintain the State owned rail lines, and would delay maintenance of track structure, bridges, culverts etc. Many of these items are already behind schedule due to current budget constraints. Level or decreased rail funding will result in deferred track and rail bridge maintenance and possible loss of connections to national/international Class I carriers. Significant cuts in rail funding could also result in emergency and safety concerns. Current rail maintenance funding is at $150,000 per year for the State's 300 miles of track. A much higher level of funding is needed in the years to come as there is a substantial backlog of work on state owned track. Realistically, a funding level of $1.6 million in the biennium in maintenance funds would be adequate to maintain the system of State owned trackage (300 miles) in a constant performance/condition state. An estimated $500,000 annually in funding from railroad excise tax on fuel which will now come to the newly established multimodal Star account will be used to help with

maintenance items but more funding is needed. An investment of $7.6 million in the biennium would allow improvements to State-owned trackage, fund a $2 million IRAP program, and allow improvements to important interchange yards. Lack of investment in the state's rail system results in increased pavement deterioration and bridge stress on Maine's highway network, as freight moves increasingly by truck. An increase in funding would allow us to catch up on this backlog and look at system improvements such as new rail sidings to facilitate higher use of the system.

Air Freight

There is a need for new funding in the $500,000 range for air freight opportunities to partner with private air freight couriers as no funding has been allocated in past BTIPs.

7.6 Conclusions

7.1 Maine's Freight Transportation System Needs (in millions of 2005 dollars)

Freight Transportation	2002-2003	2004-2005	2006-2007	STATUS QUO Investment Level (Average Over 3 Biennia)	To Maintain Constant Performance/ Condition	Biennial Strategic Need
Cargo Ports	4.8	2.2	2.1	3.0	0.6	11.8
Freight Rail	0.3	0.3	0.9	0.5	1.6	7.6
Motor Carrier	1.6	2.1	2.4	2.0	2.0	3.9
Air Freight	0.0	0.0	0.0	0.0	0.0	0.5
Total:	**6.7**	**4.6**	**5.4**	**5.6**	**4.2**	**23.8**

8.0 Intelligent Transportation Systems

8.0 Intelligent Transportation Systems

8.1 Utilization of New Technology

Sometimes travel can be a challenge. The challenges can include winter weather conditions, and increased numbers of vehicles, especially during peak tourist season. In addition, vehicle crashes can cause delays on particular corridors where there are few alternative routes.

The application of electronic and communications technology can help to relieve some of these problems. These technologies, collectively labeled as ITS, have potential benefits in the following areas:

- Capital, operations and maintenance cost savings
- Safety and security
- Energy and environment
- Service quality
- Efficiency
- Productivity

MaineDOT is investing in the state's transportation future by using technologies and strategies to help enhance quality of life and to facilitate daily activities such as:

- getting to work
- taking the kids to social or educational activities or events
- going for a weekend drive in the country
- driving a truck across the state to move goods
- using alternative modes of travel

The Department has made significant strides since our first State of the System Report in 2002 in developing "Intelligent Transportation Systems". MaineDOT has made significant progress in the following areas:

- Traffic management
- Travel information (including flood and weather information)
- Public transit management
- Safety measures
- Commercial Vehicle Operations (CVO)

MaineDOT is not making these transportation improvements alone. Stakeholder partnerships are key. These strategies and initiatives require time, money, and a team effort. Maine uses proven 21st century technologies in a series of projects designed to provide benefits for Maine's transportation system and economy. We are making travel for Maine's citizens and visitors **Safer - Faster – Smarter.**

In 2005 the Department completed two major initiatives focused on coordination and planning for future ITS integration and deployment. Those initiatives were the development of: 1) the ITS Integration & Operations (I&O) Plan, and 2) the identification of Statewide ITS Architecture. The I&O Plan was a study that included stakeholder meetings, an ITS needs assessment, a review of available technologies,

recommendations for ITS implementation, organizational recommendations for ITS, and an initial outline of the Statewide ITS Architecture needs. The Statewide ITS Architecture is required for Federal ITS funding and is aimed at creating a conceptual framework for future ITS developments.

The following figure 8.1 represents an inventory of existing ITS deployments statewide. In order to be consistent with this document and the ITS Statewide architecture market package, system headers and designations are used.

8.0 Intelligent Transportation Systems

8.1 Existing ITS

Market Package/ System	Deployment Location(s)	Responsible Agency	Description/Notes
TRAFFIC MANAGEMENT			
Network Monitoring			
MaineDOT Radio Room	Augusta	MaineDOT	24/7 operations, provides Traffic Operations functions Activates Radio Operated Speed Signs
MaineDOT Field Devices	Statewide	MaineDOT	11 permanent class stations 42 permanent count stations 1000+ short term counting sites
MaineDOT Field Devices	Various Locations Statewide	MaineDOT	Truck Speed Warning Systems, Road sensors/classifiers, Flashing beacons.
Local Field Devices	Norridgewock	Local Municipalities	Town of Norridgewock Intersection Collision Avoidance Warning System (ICAWS) Warn drivers on side streets of main street activity. More automated system planned in 4 years.
MaineDOT Field Devices	I-95 North of Augusta	MaineDOT	Radio Operated Speed Signs (ROSS) Beacon Signs
Traffic Information Dissemination			
MaineDOT Regional Offices/ Camps	5 locations	MaineDOT	District Headquarters Traffic Operations Center Functions
MaineDOT Field Devices	Statewide	MaineDOT	Changeable Message Signs (CMS) Several with cellular communications Controlled from districts
Advanced Railroad Grade Crossing			
Wayside Equipment	Statewide	Amtrak	Horn and actuated signal systems. Prediction systems Amtrak Downeaster grade crossing systems.
Parking Management Systems			
Parking Management System	Acadia National Park	Downeast Transportation Inc.	Sand Beach Parking Lot Vehicle counting, video surveillance Info available on 511
Drawbridge Management			
Bridge Control Tower	Statewide (7 Locations)	MaineDOT	7 bridges are staffed 24/7.
Bridge Control/Warning	Casco Bay Bridge	MaineDOT	Roadway signs for "Bridge Open"

8.0 Intelligent Transportation Systems

Market Package/ System	Deployment Location(s)	Responsible Agency	Description/Notes
Devices			Bridge operator has internet capability (could enter data into ISP)
PUBLIC TRANSPORTATION			
Transit Vehicle Tracking			
GPCOG Communications Center	Portland	GPCOG	Houses the server that supports transit AVL
Transit Vehicle	Portland	Transit Service Providers	AVL - Portland Explorer pilot study (3 vehicles). Vehicle position displayed on TIDS. (GPCOG)
Transit Vehicle	Mount Desert Island / Acadia National Park Schoodic Peninsula	Downeast Transportation Inc.	Integrated system: AVL, APC, 511 link, and a Station/Stop Annunciation System. (Downeast Transportation Inc.)
Transit Fixed Route Operations			
Transit Management Center	Portland	Transit Service Providers	Fixed Route Scheduling Software (METRO)
Transit Management Center	Mount Desert Island / Acadia National Park Scoodic Peninsula	Transit Service Providers	Fixed Route Scheduling Software (Downeast Transportation Inc.)
Demand Response Transit Operations			
Transit Management Center	Portland	Transit Service Providers	Computer Aided Dispatch System (RTP)
Transit Passenger and Fare Management			
Transit Vehicle	Mount Desert Island / Acadia National Park Schoodic Peninsula	Transit Service Providers	APC: Integrated system: AVL, APC, 511 link, and a Station/Stop Annunciation System. (Downeast Transportation Inc.)
Transit Security			
Transit Vehicle	Mount Desert Island / Acadia National Park Scoodic Peninsula	Downeast Transportation Inc.	Mayday Mobile Data Terminals installed on new transit line. (Downeast Transportation Inc.)

8.0 Intelligent Transportation Systems

Market Package/ System	Deployment Location(s)	Responsible Agency	Description/Notes
Transit Traveler Information			
Transit Vehicle	Mount Desert Island/Acadia National Park Scoodic Peninsula	Transit Service Providers	Passenger Information Display System (PIDS) Station/Stop Annunciation System (Downeast Transportation Inc)
Traveler Information Display Systems (TIDS)	Portland	Greater Portland Council of Governments (GPCOG)	7 TIDS locations including Jetport. Information displayed includes: Ferry services, busses, Airlines www.transportme.org
Flight information Display System (FIDS)	Portland	Airport Authorities	Automated (real time) system displays flight status from the Jetport. Information displayed on TIDS.
Transit Website	Statewide	MaineDOT	CARS – MODES: Pilot phase with 6 transit agencies. Internet access to schedule and real time transit info. Expansion to 20 agencies - bus transit and rail (Amtrak) and Island Explorer. No pre-trip planning.
GPCOG Communications Center	Portland	GPCOG	24/7 communication center, provides Transit ISP functions
COMMERCIAL VEHICLE OPERATIONS			
Electronic Clearance			
Unified Motor Carrier Administration Management System (UMCAMS)	Statewide	Bureau of Motor Vehicles (BMV)	UMCAMS Database. Real time credentialing to SP Commercial Vehicle Enforcement Unit (CVEU) vehicles through website.
Weigh-In-Motion (WIM)			
Commercial Vehicle Roadside Inspection Station	Statewide Verona Island Old Town	MaineDOT	Weigh in Motion: 13 sites. Most sites used for planning Old Town location used to prescreen vehicles.
ARCHIVED DATA MANAGEMENT			
Data Warehouse			

8.0 Intelligent Transportation Systems

Market Package/ System	Deployment Location(s)	Responsible Agency	Description/Notes
Transportation Information for Decision Enhancements (TIDE).	Augusta	MaineDOT	GIS data warehouse 15 years of crash/traffic counter data. Information provided from the local police to the state police to the DOT to TIDE. MaineDOT Planning section is building a new crash records system.
CARS (Condition Acquisition System and Reporting System)	Statewide	MaineDOT	CARS provides most of the core information on road and traffic conditions in the TRIO architecture. It is has been deployed in all three states and functions as the central repository for travel information pertaining to the highway system.
Interactive Traveler Information			
TRIO Tri-state Travel information online	Statewide	MaineDOT	TRIO Database Amber alerts are not yet active but will be inputted to ISP in 2005.
511	Statewide	MaineDOT	Advanced travel information by telephone
www.511me.com	Statewide	MaineDOT	Website for traveler information
MAINTENANCE AND CONSTRUCTION MANAGEMENT			
Road Weather Data Collection			
Roadway Weather Information Systems (RWIS)	Statewide	MaineDOT	MaineDOT owns four full RWIS and one mini RWIS station.
State Maintenance Vehicle	Statewide	MaineDOT	MaineDOT SIR vehicles infrared sensors Air and pavement temperature readings called into the Radio Room and maintenance camps.
Weather Information Processing and Distribution			
Surface Transportation Weather Service	Statewide	MaineDOT	This ITS subsystem represents the providers of specific meteorological services. These providers utilize National Weather Service data and predictions, road condition information and local environmental data.
Transportation Infrastructure Protection			
Infrastructure Safety and Security Monitoring Systems	Waldo-Hancock Bridge (Verona Island)	MaineDOT	Advanced warning systems for overweight vehicles.
Infrastructure Safety and Security Monitoring Systems	Waldo-Hancock Bridge Deer Island	MaineDOT	The bridge breach system will be monitored by MaineDOT bridge control, and the maintenance camps near the facility. Waldo Hancock – cables on this bridge will be monitored for breaches at Waldo Hancock Facility.

8.0 Intelligent Transportation Systems

Market Package/ System	Deployment Location(s)	Responsible Agency	Description/Notes
			Deer Island – cable suspension bridge monitored locally for wind speed, velocity and movement.
Infrastructure Safety and Security Monitoring Systems	Statewide	MaineDOT	USGS River gauge information flows to Maine OIT. MaineDOT M&O monitors data (website) for water levels, ice flows, alarms. EOC monitors river gauges through SWIMS
Infrastructure Safety and Security Monitoring Systems	Portland Augusta Casco Bay Bridge Aroostook County	MaineDOT	Surveillance Cameras Portland - waterfront cameras to monitor port traffic. Piscataquis Bridge – Installed by NHDOT

8.0 Intelligent Transportation Systems

8.2 Intelligent Transportation Systems

TRavel **I**nformation **O**nline - The Department has made significant strides since our first State of the System Report in 2002 in developing "Intelligent Transportation Systems". The majority of the work to develop the information system has initially been accomplished in partnership with two other New England States, New Hampshire and Vermont. The project has been named **TRIO**, **TR**avel **I**nformation **O**nline. The TRIO project provides accurate and real time information on road conditions, road work, weather alerts and advisories, incidents, local events and any major delays that occur on the highway system. Travelers can make informed decisions before and while on their trips using their phones and by looking for information on the internet at MaineDOT's 511 websites. We are in the process of deploying Changeable Message signs in both the Portland and Bangor areas.

CARS (Condition Acquisition and Reporting System) - Maine has also partnered with five additional states using the CARS software system in a "Pooled Fund" approach to system operations and improvements. CARS uses the World Wide Web to allow authorized staff to input construction, accident, delay, and other roadway, weather and tourism event information into statewide databases. The CARS server also supports routine MaineDOT dispatch, press release and emergency response activities.

FORETELL Road and Weather Prediction System - FORETELL complements CARS by adding a predictive component to road condition reporting. FORETELL is designed to meet the winter information needs of travelers and highway maintenance managers, combining weather and road condition predictions every hour for up to 24 hours ahead.

511 Interactive Voice Response System and www.511Maine.gov - MaineDOT launched the 511 website and 511 interactive telephone voice response systems in 2003. These were the first deployments of dissemination systems providing real time travel information contained in the CARS system. In 2004, MaineDOT was the first in the nation to offer real time travel information in a foreign language with the deployment of our 511 website in French. Information includes:

- Highway Traffic
- Road Weather
- Regional Summary
- Acadia National Park and Bar Harbor Region, Tourism
- Ferry Service & Transit
- Other States
- Help with 511
- All Advisories
- Major Delays
- Roadwork
- Road Conditions
- Weather Forecasts and Weather Alerts
- Commercial Vehicle
- Links to the Maine Office of Tourism, MTA, Acadia National Park and Public Transit information,
- Traffic cameras at key points on Maine highways and the MSFS.

511Maine has had over 1.1 million hits since May of 2003.

AMBER ALERT

The AMBER (America's Missing: Broadcast Emergency Response) Plan Program is a voluntary program through which emergency alerts are issued to notify the public about abductions of children. These child abduction alerts may be communicated through various means including radio and television stations, highway advisory radio, changeable message signs (CMS), and other media.

The AMBER Plan Program encourages use of the most effective methods to communicate with the public on behalf of abducted children. The CMS can convey only a limited amount of information to motorists. When there is a need to provide extensive information to motorists, it is critical that other types of traveler

information based media (e.g., 511, highway advisory radio, web sites, commercial radio) be used, or that the messages displayed on a CMS supplement these other media. We continue to discourage the display of general public information or other nonessential messages on CMS.

CARS – MODES

The CARS – MODES module of the TRIO project addresses the development of multi-modal transit information by developing new software to handle transit's special characteristics, including schedules, routes, and connections. MODES will integrate published schedules with transit events such as service disruptions.

CARS-CVO

The CARS-CVO (Commercial Vehicle Operations) supports oversize and overweight permitting. The CARS-CVO application will allow entry of permit application information including carrier information, commercial vehicle parameters, time/date of travel, and selected routes of travel into the system. CARS-CVO will allow the permit clerk to issue permits and inform commercial carriers about any restrictions that might prevent their travel.

8.3 Commercial Vehicle Intelligent Transportation Systems

As a member of the Intelligent Transportation Systems/Commercial Vehicle Operations (ITS/CVO) Working Group, MaineDOT supported several initiatives to utilize emerging ITS technologies in commercial vehicle operations. The working group sponsored a project to install the Unified Motor Carrier Account Management System UMCAMS at the BMV. This system ties together several motor carrier databases on commercial vehicle registration, fuel tax and federal safety inspection ratings (PRISM) using the USDOT numbers as a common identifier. This system makes these data available to State Police enforcement personnel in the field on a 24/7 basis via laptop computers in enforcement vehicles. Plans are to fund further enhancements including access to court violations and safety data, and an electronic weight violations process. Thus far, UMCAMS has been deemed highly successful by the BMV and the Maine State Police, who use the system extensively in their field enforcement activities. MaineDOT is undertaking a project to provide vehicle screening at the Kittery-York weigh stations. Weighing and credential screening technology will enable compliant motor carriers to bypass enforcement details, allowing enforcement to concentrate monitoring efforts on non-compliant vehicles. Systems will include ramp weigh-in-motion, height detectors, and transponder readers capable of interacting with vehicle transponders in mainstream traffic.

8.4 Planned ITS Projects

The ITS Strategic Plan and the ITS Architecture project recommend a series of ITS projects that will assist in providing better, more reliable, more efficient, and safer transportation to residents and tourists. These projects have been recommended based on stakeholder outreach and needs assessments.

The ITS Program from the MaineDOT ITS Strategic Plan for the next 10 years is outlined in figure 8.2 below. This fiscally unconstrained plan involves about $30 million worth of ITS projects based on a statewide needs assessment. The current Capital Work Plan includes about $7 million towards these goals. The figure does not include an additional $2.5 million for 511 operations and CARS enhancements.

8.2 Summary of Planned ITS Projects and Costs

8.0 Intelligent Transportation Systems

ITS Projects	Average Capital Cost ($)	Average Operations & Maintenance Costs ($)
Traffic Management Project		
Statewide ITS Architecture	$125,000	$20,000
Arterial Traffic Management System	$825,000	$82,500
Traffic Incident Management	$1,485,000	$148,500
Traveler Information System	$5,730,000	$573,000
Staff Training and Public Outreach	$350,000	$35,000
Subtotal	**$8,515,000**	**$859,000**
Maintenance and Operations Project		
AVL for Winter Maintenance	$2,000,000	$200,000
Road Weather Information System	$1,782,000	$178,200
Work Zone Management And Safety System	$965,000	$96,500
Subtotal	**$4,747,000**	**$474,700**
Safety and Emergency Management Project		
Intersection Collision Avoidance	$105,000	$10,500
Animal Collision Avoidance Pilot Study	$20,000	$2,000
Highway Rail Intersection Pilot Study	$1,000,000	$100,000
Pedestrian Safety Systems Pilot Study	$10,000	$1,000
Traffic Operations Center Development	$4,725,000	$750,000
Critical Infrastructure Monitoring Systems	$380,000	$38,000
Subtotal	**$6,240,000**	**$901,500**
Commercial Vehicle Operations Project		
CV credentialing and screening systems	$1,540,000	$154,000
HAZMAT coordination system	$290,000	$29,000
CVO outreach	$225,000	$22,500
Subtotal	**$2,055,000**	**$205,500**
Transit Projects		
CAD/AVL	$1,901,000	$193,300
Fixed route scheduling	$368,000	$53,600
Automatic Passenger Counters	$417,000	$31,100
Automated Annunciation System	$763,000	$55,500
Website enhancements	$106,000	$10,600
En-route traveler information	$425,000	$62,100
Electronic Payment System	$2,280,000	$136,200
Park & ride information	$155,000	$10,400
Vehicle component monitoring	$158,000	$13,300
Subtotal	**$6,448,000**	**$566,100**
Grand Total	**$28,130,000**	**$3,006,800**

8.5 ITS Technology Performance Evaluation

The purpose of a monitoring and evaluation program is to determine the success of project implementations and to document lessons learned. MaineDOT recognizes the importance of performance evaluation; monitoring and evaluation is an important part of ITS program management. It consists of measuring the effects of deployed projects, with the goal to better understand and improve on operations.

There are several reasons why it is important to monitor and evaluate projects, including:

- Verifying whether or not the ITS project sponsor and partners are accomplishing objectives and obtaining needed information.
- Helping to understand the causes of problems associated with project deployment, and finding ways to resolve issues;
- Offering ideas on how to plan for future deployments of similar projects;
- Helping other projects move forward, by sharing lessons learned from the project implementation experience.

The following figure outlines goal areas and measures that will be used to evaluate ITS deployments.

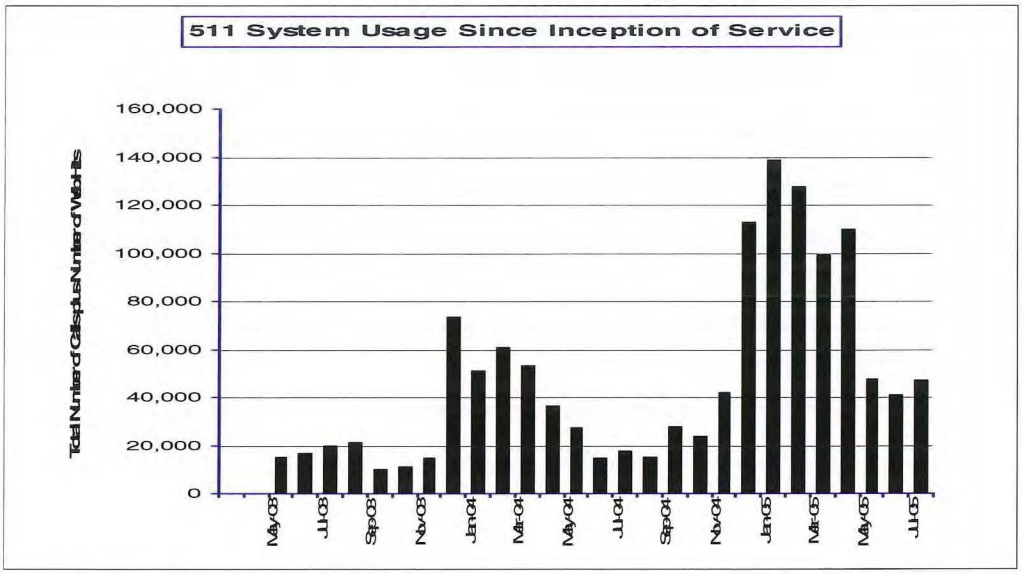
8.3 Evaluation Goals & Measures of Effectiveness

Goal Areas	Measures
Safety	• Reduction in the overall Rate of Crashes • Reduction in the Rate of Crashes Resulting in Fatalities • Reduction in the Rate of Crashes Resulting in Injuries
Mobility	• Reduction in Travel Time Delay • Reduction in Travel Time Variability • Improvement in Customer Satisfaction
Efficiency	• Increases in Freeway and Arterial Throughput or Effective Capacity
Productivity	• Cost Savings
Energy and Environment	• Decrease in Emissions Levels • Decrease in Energy Consumption

Much of MaineDOT's ITS deployment program is in its early stages. The effectiveness of various initiatives has not been fully evaluated, though early indications are very favorable for several initiatives.

For example, public use of the 511 system has grown dramatically since its inception in 2003 as shown in figure 8.4 below.

8.4 Number of Calls for 511 System



The Department's participation in the Acadia National Park *Island Explorer* project has received national recognition. The project was the subject of a Federal evaluation. The excerpt below gives an indication of the public satisfaction with the technologies deployed there.

90% of visitors surveyed at the Acadia National Park in Maine say transit information signs made it easier to get around.

A primary objective of the Acadia National Park field operational test was to provide timely and accurate information to visitors about the Island Explorer shuttle bus service. As part of the test, electronic message signs were installed at bus stops at three of the most popular destinations in the park, and visitors were given real-time transit status information showing updated bus departure times. In addition, shuttle buses were equipped with on-board next-stop announcement systems to inform riders of the approaching destinations as they traversed the park.

According to the survey, most visitors found the information they received to be accurate, clearly understandable, and easy to use. Ninety percent of visitors who used the real-time transit departure signs, and 84% of visitors who experienced the automated on-board next-stop message announcements, agreed these technologies made it easier to get around.

8.6 ITS Funding Scenarios & Implications

Because ITS is an area of increasing emphasis within the transportation sector, the assumptions on status quo funding are difficult to make. Making assumptions about future technology is a little like predicting the future direction of computer technology. Most of the ITS implementations are new initiatives that have begun only recently. MaineDOT is fortunate to have received Federal support for many of the new ITS projects. The baseline assumption would be continued ITS funding at the current level of $ 7 million per biennium.

The ITS Statewide Strategic Plan recommends a $30 million investment over the next ten years. Additionally another $2.5 million will be needed for 511 operations and CARS enhancements.

However the Strategic Plan suggests first priority deployments over the first three years that amount to nearly $23 million. The selection of priority projects is based on their being either essential "foundation" projects or "early winner" projects that provide high benefits in combination with modest capital cost, to help build public and legislative support for the ITS program.

The potential implications of maintaining status quo investment include slower public/political support and acceptance and inefficiencies in program development. For example our current operations center, the radio room, may not be the most effective facility to operate dynamic message signs, incident

management systems, critical infrastructure security systems and other ITS devices. The 2006-07 Capital Work Plan funds only a feasibility study and business plan development for a statewide traffic operations center. Careful planning and deployment of systems can offset this potential problem.

Increase 20% Scenario

A 20% increase in that level would mean that an additional $1.4 million would be available for ITS infrastructure. This amount is roughly equivalent to the capital requirements for a single arterial traffic management system such as currently proposed for Western Avenue in Augusta. The 20% increase in funding would mean that one more clogged arterial could have a coordinated signal system. In other states these kinds of optimized signal systems have been shown to reduce delay by 14-19% and reduce vehicle emissions by 9-13%, providing both congestion relief and environmental benefits. This result represents direct, positive, measurable benefits for Maine.

As another example, an Interstate highway traffic incident detection system is planned for the I-295 area near Portland to mitigate the effects of traffic incidents on congestion. The current Capital Work Plan includes the project at a cost of roughly $1 million. An increased ITS funding level of $1 million would pay for an additional incident detection system for another Maine arterial. The projected benefit/cost ratio for this system is 6:1. In addition, states that have evaluated these systems have reported a decline in average incident duration at those locations by 15-30% and average delay per incident has declined by 36-66%. This reduces fuel consumption and lost time by similar amounts as well, leading to productivity gains and environmental benefits.

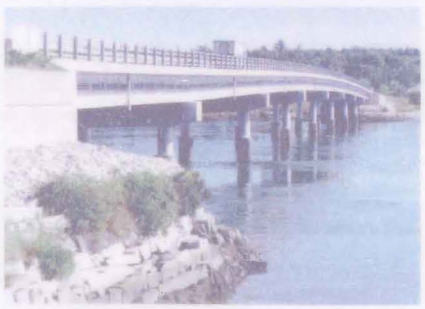
Decrease 20% Scenario

A 20% decrease in funding level would mean that $1.4 million less would be available for ITS infrastructure. This would involve extending the implementation and build-out of the ITS Strategic plan by possibly two years. This could mean reductions in traveler information systems, commercial vehicle credentialing systems, work zone safety technologies, transit vehicle location or maintenance technologies, and might delay the continuing development of traffic operation center (TOC) capabilities. All of these types of initiatives combined represent about $1 million in the current Capital Work Plan. National studies have shown 12% improvements in system efficiencies using TOC technologies. States that have used new work zone technology have reported decreased queue lengths of 33%. Productivity gains from CVO credentialing cannot be overestimated, as other states have reported 4:1 benefit/cost ratios for these systems. Millions of dollars in fuel and labor savings have been reported nationally. The motor carrier industry estimates the benefit/cost of automatic credentialing systems to be in the order of 6:1 to 10:1. The benefits of message signs and traveler information would also be affected. Information from other states shows satisfaction ratings of 75-90% from motorists in the areas of accuracy, availability, usefulness and understandability of Travel Information Systems such as Maine is currently developing.

8.7 Conclusions

8.5 Maine's ITS Needs (in millions of 2005 dollars)

	2002-2003	2004-2005	2006-2007	STATUS QUO Investment Level (Average Over 3 Biennia)	To Maintain Constant Performance/ Condition	Biennial Strategic Need
ITS			4.6	4.6	1	6.6



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