

**MASSHIGHWAY ON THE MOVE**

Dear Citizen:

Thank you for taking the time to read MassHighway's second quarterly ScoreCard for 2009.

Included in this edition is a special section called, "Getting the Job Done" highlighting the impact of MassHighway's streamlining efforts. Productivity has increased across the entire organization leading to significant reductions in timelines for construction contracting. By shortening timelines for construction contracting, projects get out the door and underway sooner. Together, these efforts are providing a significant boost to the Massachusetts economy, creating jobs and improving the condition of infrastructure.

This addition all includes a section highlighting some initial results of the streamlining plan kicked off in April 2008. To date, MassHighway has improved adherence to timelines and budgets started after the streamlining plan was announced. MassHighway is focused on ensuring that these improvements are maintained and improved upon. In upcoming editions of the ScoreCard, information in this section will continue to be expanded upon.

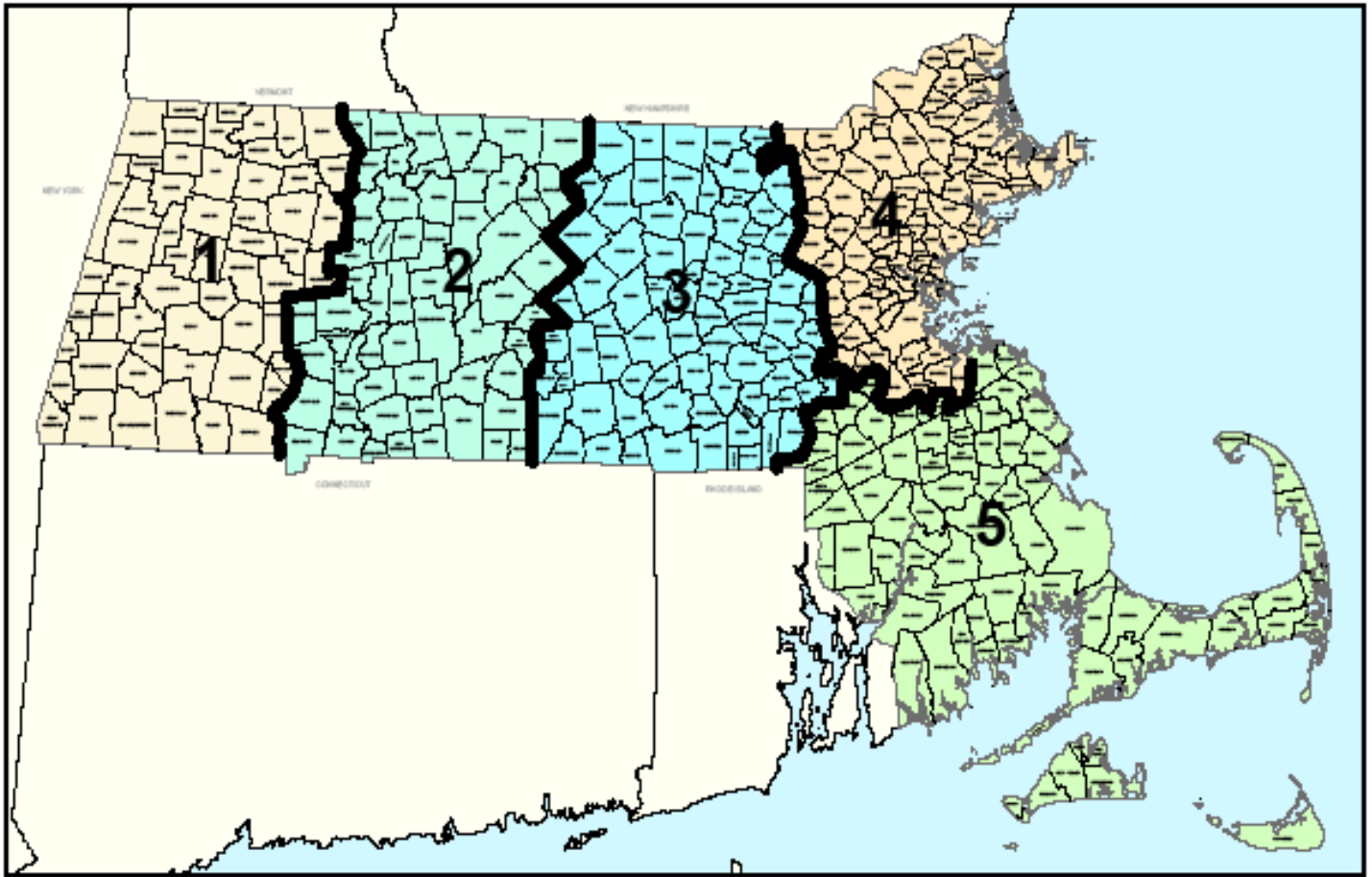
Since the last edition of the ScoreCard, MassHighway mobilized to get shovels in the ground on projects funded by the American Recovery and Reinvestment Act. To learn more about these projects and view an interactive map of projects and for the most current progress updates please visit: <http://www.eot.state.ma.us/recovery/>.

The Accelerated Bridge Program is in the midst of its first construction season. Many projects are underway across the state. In this quarter, we completed our first accelerated bridge program project thanks to significantly increased funding. Thanks to streamlined design and construction procedures, MassHighway has reduced the number of structurally deficient bridges over the last year. To learn more about progress on implementing the accelerated bridge program, visit [www.mhd.state.ma.us/acceleratedbridges](http://www.mhd.state.ma.us/acceleratedbridges).

MassHighway continues to be challenged as never before and in meeting these challenges, we will continue to focus on innovating, streamlining, and completing projects more efficiently.

Luisa Paiewonsky  
Commissioner

# DISTRICT MAP



The Massachusetts Highway Department (MassHighway) has five district offices, all of which operate under the direction of Headquarters in the State Transportation Building in Boston.

MassHighway's Boston office makes the policy decisions that lead to the road improvement projects that are planned or are ongoing across the Commonwealth. Under the direction of Commissioner Luisa Paiewonsky, MassHighway identifies roads and bridges that are in need of repair, reconstruction, or replacement, and works to make the appropriate upgrades. MassHighway's priority is safety with as little inconvenience as possible to Massachusetts motorists.

Each district is under the direction of the District Highway Director (DHD) who reports to Chief Engineer Frank Tramantozzi. The District Office supervises all construction within its jurisdiction; performs on-site engineering; implements maintenance and preventive maintenance programs; generates proposals for maintenance and construction work; and provides engineering support to cities and towns.

#### **District 1**

**Peter Niles, P.E.,**  
District Highway Director  
270 Main St.  
Lenox, MA 01240

#### **District 2**

**Albert Stegemann, P.E.,**  
District Highway Director  
811 North King St.  
Northampton, MA 01060

#### **District 3**

**Thomas Waruzila**  
District Highway Director  
403 Belmont St.  
Worcester, MA 01604

#### **District 4**

**Patricia A. Leavenworth, P.E.**  
District Highway Director  
519 Appleton St.  
Arlington, MA 02476

#### **District 5**

**Bernard McCourt**  
District Highway Director  
1000 County St.  
Taunton, MA 02780

# REFERENCE

**Late NTP:** Notice To Proceed is notification to the contractor to begin work. If it issued later than anticipated when contract duration was set a contractor is entitled to additional time according to the contract.

**Utility Delay:** Construction delayed waiting for utility companies to move their facilities.

**EWO:** Extra Work Order, additional work required to complete the original design which was not included in the contract.

**City/Town Request:** Requests made by a municipality during construction that was not included in the contract.

**Permits:** Construction delays due to time required to modify or issue a permit such as Army Corp., DEP, MHC, local Conservation Commission, etc.

**Design Errors/Omissions:** items that were either the result of a defect in the original design or not included in the contract.

**Changed Conditions:** Delays caused by subsurface or latent field conditions that could not have been known before construction; usually underground soil conditions that require changes to the base scope.

**Environ/Haz Waste:** Delays resulting from unexpected hazardous soils or other unexpected environmental conditions, usually resulting for special handling required.

**Act of God:** Any restriction to the work as a result of an extraordinary event that could not have been foreseen nor prepared for at the time of bid such as extreme weather events, acts of governments, fires, etc.

**Third Party:** Any delay caused by the actions of a third party not more specifically defined in any other category, such as an abutter.

**ROW:** Delays caused by procuring right of way (property or access to property) necessary for base scope work.

**Admin:** Administrative extensions for processing paperwork at contract closeout after all field work has been completed.

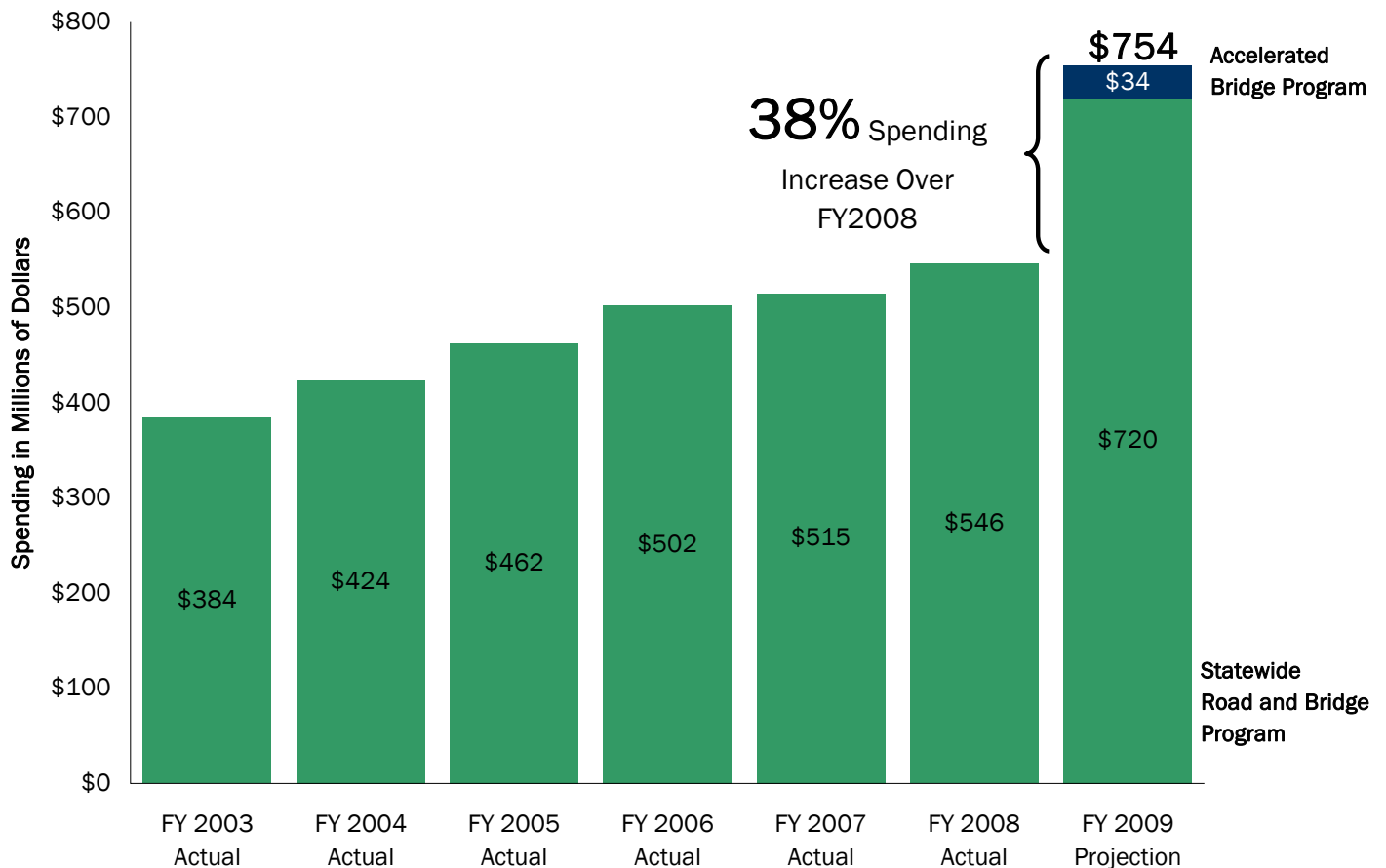
**Railroad:** Delays caused by railroad companies

**Contractor Delay:** Delays caused solely by the Contractor.

**Winter Shutdown:** Extensions required to allow work that is weather sensitive that cannot be completed during the winter months.

# GETTING THE JOB DONE: SHOVELS IN THE GROUND

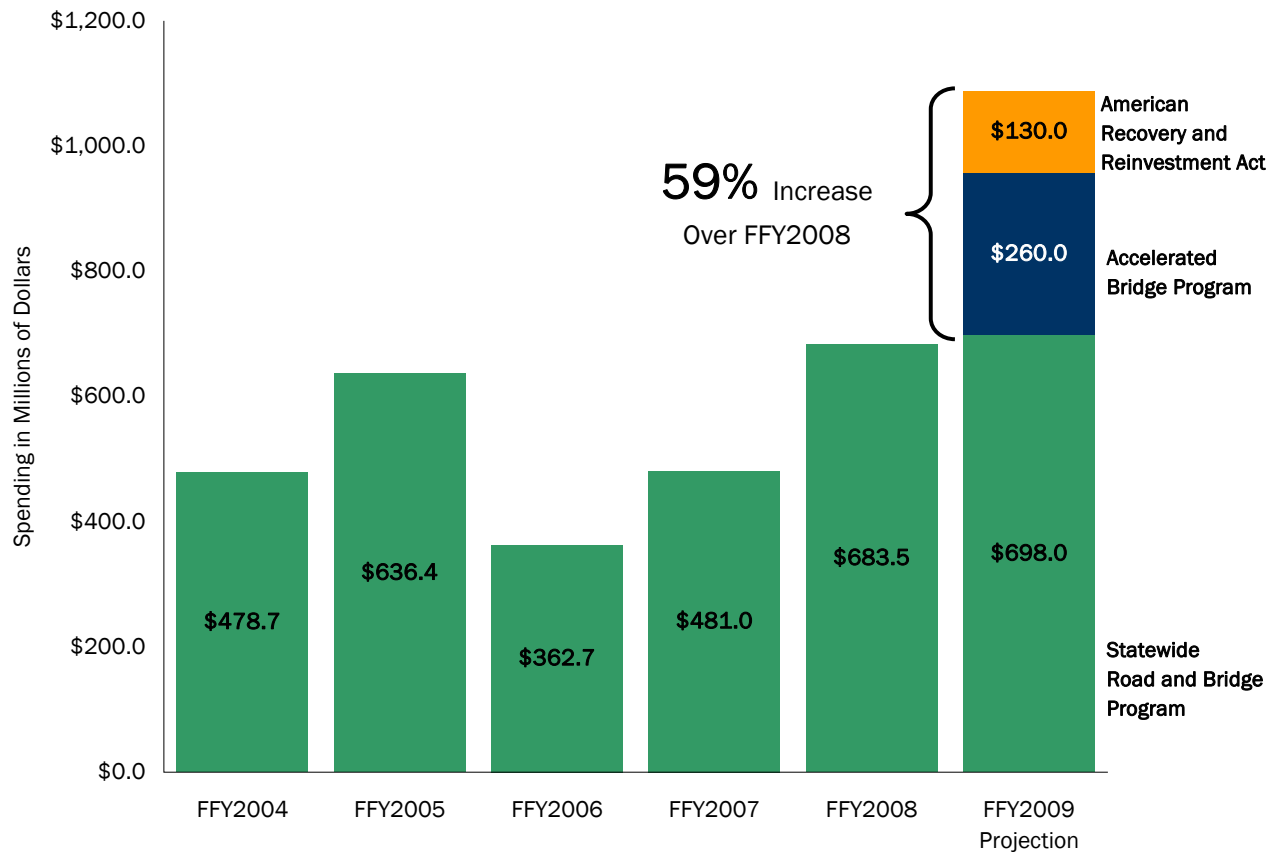
## MassHighway Construction Spending FY2003-Present



MassHighway has pushed millions of dollars of projects into the field across Massachusetts to create jobs and improve the condition of infrastructure across the Commonwealth.

- Total construction spending is projected to increase **38%** in FY2009 over FY2008 from \$546 million to \$754 million, thanks in part to the Accelerated Bridge Program which will create thousands of construction jobs.
- The projected \$720 million Statewide Road and Bridge Program constitutes the largest ever program in MassHighway history with record spending through <ay 2009.

## MassHighway Construction Bidding 2004-Present



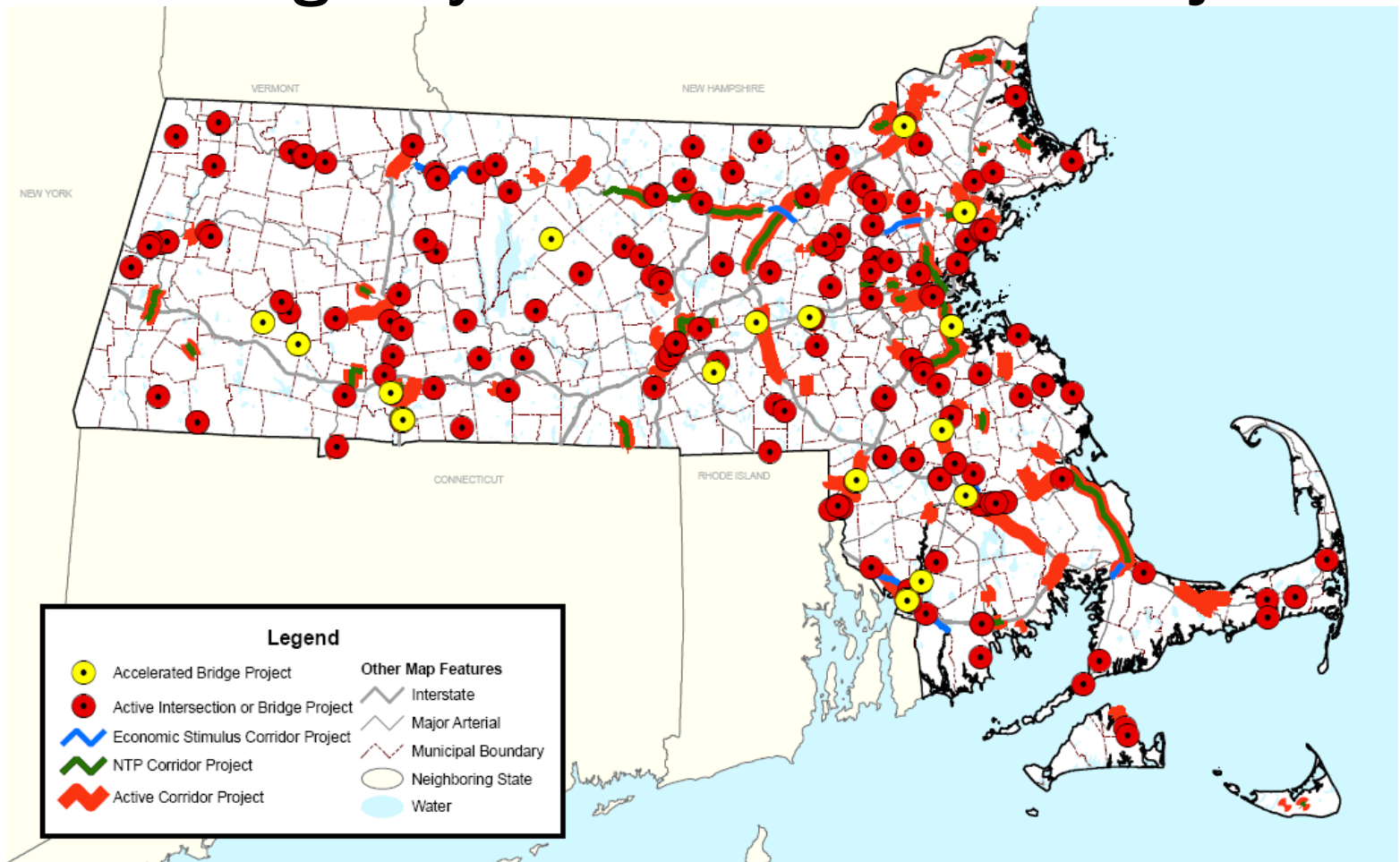
MassHighway has increased construction bidding by **59%** over FFY2008 which will dramatically increase the number of active construction projects and create thousands of jobs in the face of the economic downturn.

- In Federal fiscal year 2009 MassHighway has projected advertising of \$260 million for the Accelerated Bridge Program.
- \$130 million will be advertised as part of the American Recovery and Reinvestment Act in this quarter.
- These projects will mean a larger highway construction program and thousands of jobs over the coming years.

GETTING THE JOB DONE:

# CREATING JOBS ACROSS MASSACHUSETTS

## MassHighway Active Construction Projects



The above map shows active and recently bid MassHighway construction projects that are part of the Statewide Road and Bridge Program, Accelerated Bridge Program, and American Recovery and Reinvestment Act.

- MassHighway's construction program touches all corners and key corridors of the Commonwealth.
- MassHighway's construction program will create jobs and stimulate the economy across Massachusetts.

# GETTING THE JOB DONE: HOW MASSHIGHWAY DID IT

## Improved Productivity in Design Contracting

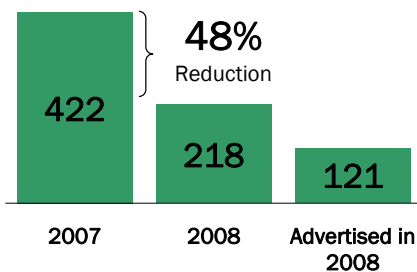
MassHighway has overhauled its design procurement process, producing dramatic productivity and efficiency gains.

Notices to Proceed on design contracts have **increased by from 38 in 2007 to 50 in 2008**. At the same time, the length of design contracting has been cut nearly in half from **12 months to 6.6**. These efficiency gains mean designs are completed sooner and projects get into the field faster.

As a result, the value of projects under design at MassHighway **increased more than \$96 million**. This increase is the result of greater efficiency and productivity in design contracting. Additionally, the value of designs has increased as a result of the Accelerated Bridge Program which will invest more than \$3 billion to reduce the Commonwealth's backlog of structurally deficient bridges over the next eight years.

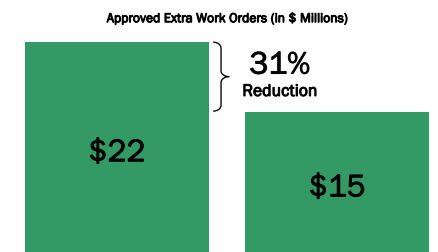
MassHighway is pushing more work out the door faster. By reducing the time needed for design and construction contracting, MassHighway is able to get projects under construction sooner creating jobs today.

## Reduced Times for Construction Contracting



MassHighway has dramatically reduced the timeline for construction contracting. In 2008, MassHighway issued Notices to Proceed (NTP) on 270 contracts, an increase over 108 NTPs issued in 2007, an increase of **150%**. At the same time, MassHighway reduced the time from construction contract advertisement to NTP from 422 days in 2007 to 218 days in 2008, a **48%** reduction. Solely on project advertised in 2008 timelines were slashed even further to 121 days.

## Construction Streamlining: Reducing Extra Work Orders



MassHighway is focused on keeping projects within original budgets so that no taxpayer dollars go to waste. From 2007 to 2008, Extra Work Orders or additional work added to a contract to complete original designs were **reduced 31%** from **\$22 million to \$15 million**. Approved requests for additional fund on construction projects were **reduced by \$13 million or 14%** from **\$90 million to \$77 million from 2007 to 2008**. This **total reduction of \$20 million** is the result of increased scrutiny given to extra work order and Additional fund requests.

## Doing Business Differently At MassHighway: Highlights

Streamlining and reform has been an agency-wide effort at MassHighway.

- MassHighway has implemented the use of flaggers on construction projects.
- Administrative Streamlining has meant re-engineered schedules and procedures
- Construction Streamlining has meant improved project delivery.
- The Accelerated Bridge Program, which will invest nearly \$3 Billion to reduce the backlog of structurally deficient bridges substantially over the next eight years, is already serving as a laboratory for innovation at MassHighway.
- MassHighway released its first ever quarterly ScoreCard in 2008



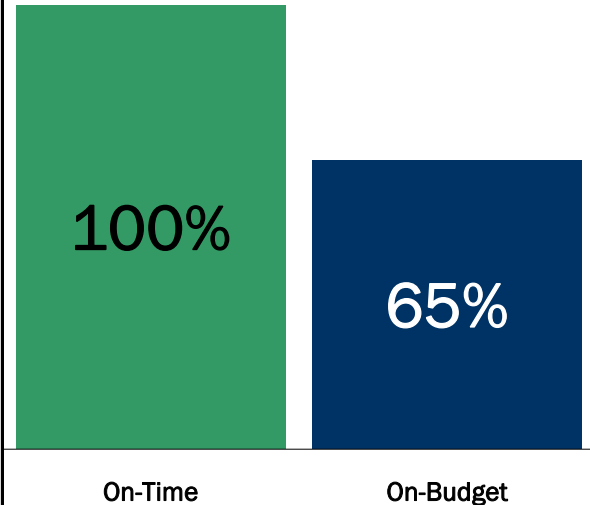
# SPOTLIGHT ON PROJECT DELIVERY

## Streamlining Success: Reform Is Working

In April 2008, Governor Patrick set forth a plan to reduce the average project of \$4-6 million timeline from ten years to less than six years. With this streamlining plan in place, MassHighway carried out an agency-wide effort to complete projects on time and on budget.

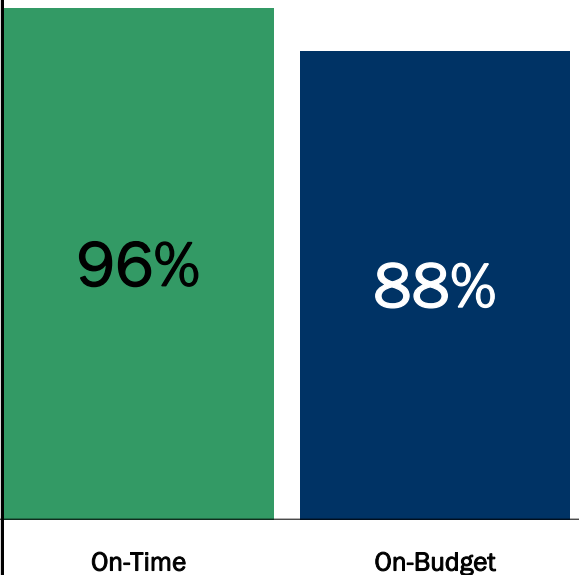
Since January 2008, MassHighway has granted notices to proceed for 217 projects. 20 of these projects have already been completed with the remainder actively under construction.

### Completed Projects:



100% of projects completed projects receiving noticed to proceed after January 2008 have been completed within original project timelines. 65% of projects receiving notices to proceed after January 2008 have been completed within original budgets. The total value of these projects was \$20,124,887.

### Active Projects:



96% of active projects receiving noticed to proceed after January 2008 have been completed within original project timelines. 88% of active projects receiving notices to proceed after January 2008 have been completed within original budgets. That full value of all active MassHighway projects started after January 2008 is over \$1 billion.

In future editions of the ScoreCard, a more comprehensive analysis for streamlined projects will be presented.

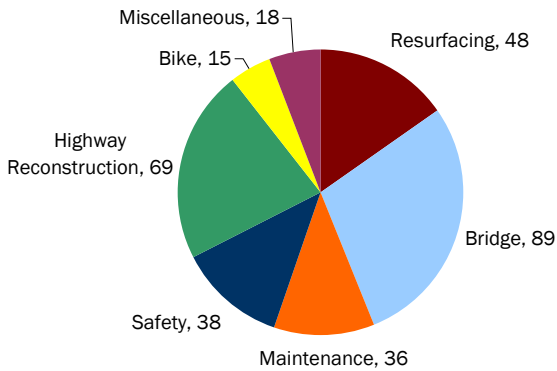
# SPOTLIGHT ON PROJECT DELIVERY

## ALL ACTIVE CONSTRUCTION REPORT

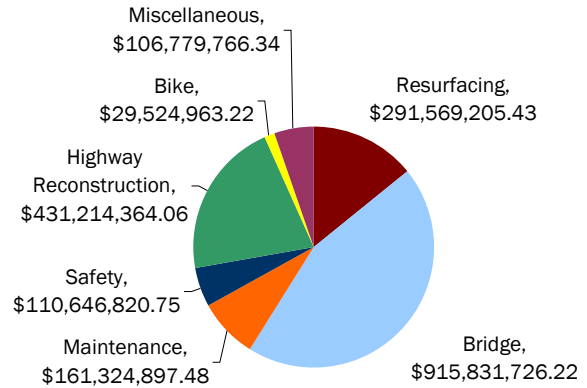
As of April 2009, MassHighway had 313 active construction projects across the Commonwealth. Additionally, there are 184 active maintenance contracts ongoing. Included in these totals are projects as part of the Accelerated Bridge Program and American Recovery and Reinvestment Act. Below is a breakdown of the ongoing MHD projects.

### Breakdown by Type:

Project Type Breakdown by Number of Projects



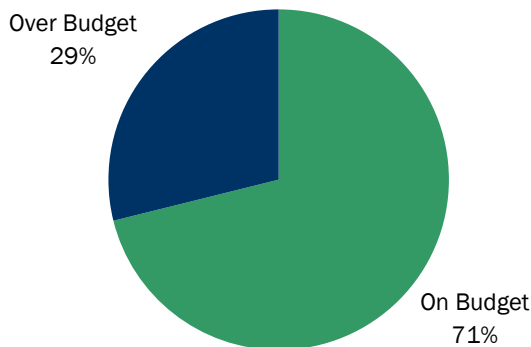
Project Type Breakdown by Project Value



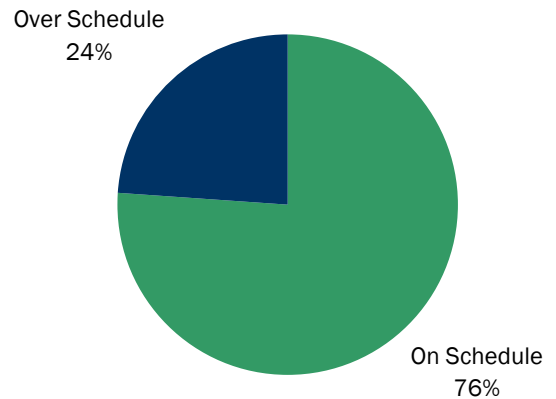
The above charts provide a breakdown of active projects by number of projects by project type and value of projects by type. The highest number of projects in both categories are bridge projects.

### Performance Summary:

Budget Performance



Schedule Performance

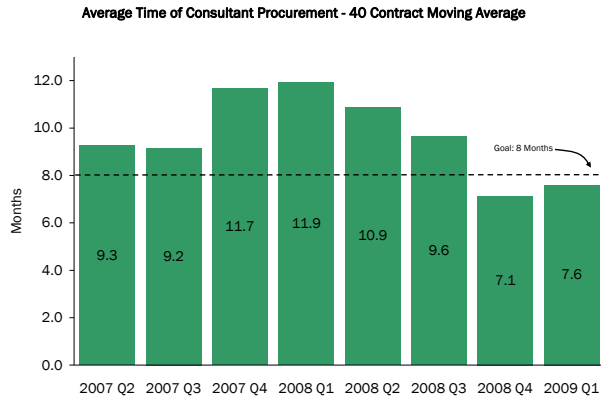


As is shown above 71% of active projects are on budget and 76% of active projects are currently on schedule.

# SPOTLIGHT ON PROJECT DELIVERY

MassHighway is committed to streamlining project delivery. In April 2008, Governor Patrick, Transportation Secretary Cohen and Commissioner Paiewonsky, set forth a plan to reduce the average project of \$4-6 million timeline from ten years to less than six years.

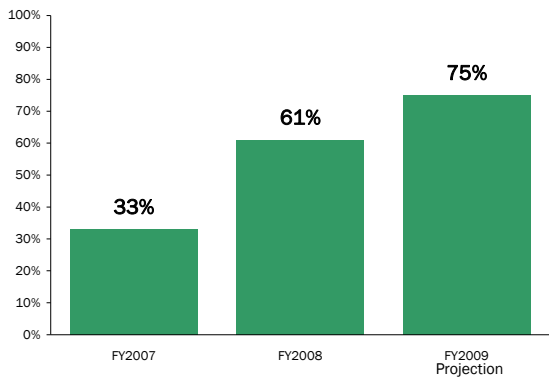
## Project Development and Design Streamlining: Faster Consultant Procurement



One of the first steps in the project delivery process is the procurement of design services to prepare construction plans, specifications, and cost estimates. The adjacent chart shows the average duration of the consultant contract procurement process for design contracts, beginning with identification of the procurement need, selection of a consultant firm, and ending with a Notice to Proceed (NTP) over the course of the most recent 40 procurements.

MassHighway is committed to reaching an average time of eight months, using a variety of strategies, including eliminating duplicative steps, re-training project managers, tracking schedules closely, and providing enhanced oversight and guidance to all those involved in the process. Each quarter, MassHighway will provide updated performance information on the number of contracts awarded and the time it took to procure each contract.

## Project Development and Design Streamlining: Faster Program Delivery



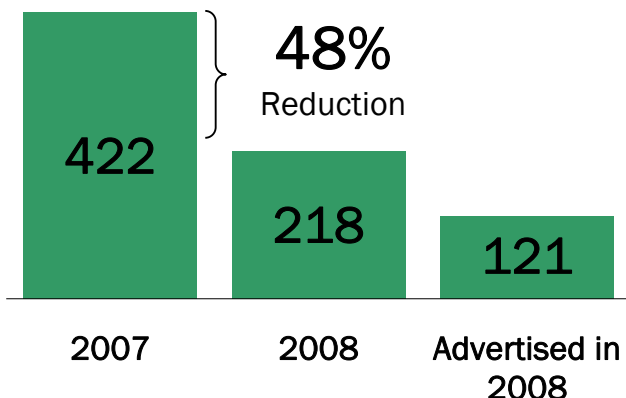
The Statewide Transportation Improvement Program (STIP) comprises the bulk of MassHighway's annual construction program. We will deliver these projects more efficiently by reducing the time it takes to perform project design, environmental permitting, and the right-of way acquisition process. Federal funding for roads and bridges is programmed by regional bodies, known as Metropolitan Planning Organizations (MPO). The funding and schedule for these STIP projects is determined through an open public process at each MPO.

Although the STIP is generally amended several times each year, MassHighway measures its success in delivering STIP projects on schedule by the percentage of projects that begin the construction contracting phase

in the same year they were programmed. This also serves as a key measure of design quality and effective project management.

As the accompanying chart shows, MassHighway nearly doubled the advertising of STIP projects between 2007 and 2008. In 2009, MassHighway projects it will increase the number of STIP projects advertised to 75%, by streamlining the project development process and working closely with Municipalities and our partners on each of the Metropolitan Planning Organizations.

## Construction Streamlining Faster—Contract Bidding and Award

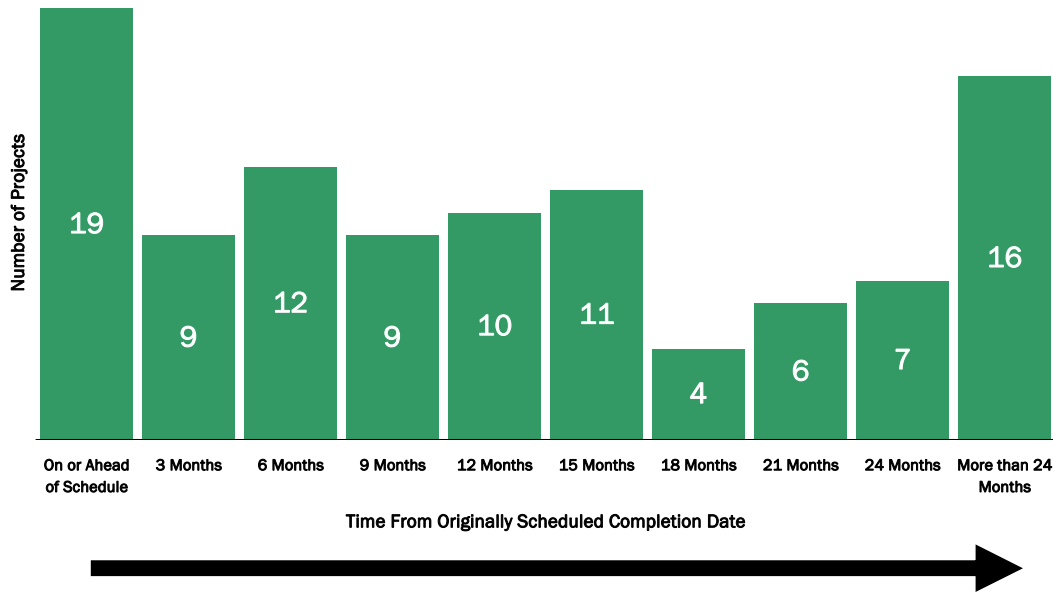


MassHighway has dramatically reduced the timeline for construction contracting. In 2008, MassHighway issued Notices to Proceed (NTP) on 270 contracts, an increase over 108 NTPs issued in 2007, an increase of **150%**. At the same time, MassHighway reduced the time from construction contract advertisement to NTP from 422 days in 2007 to 218 days in 2008, a **48%** reduction. Solely on project advertised in 2008 timelines were slashed even further to 121 days.

# SPOTLIGHT ON PROJECT DELIVERY

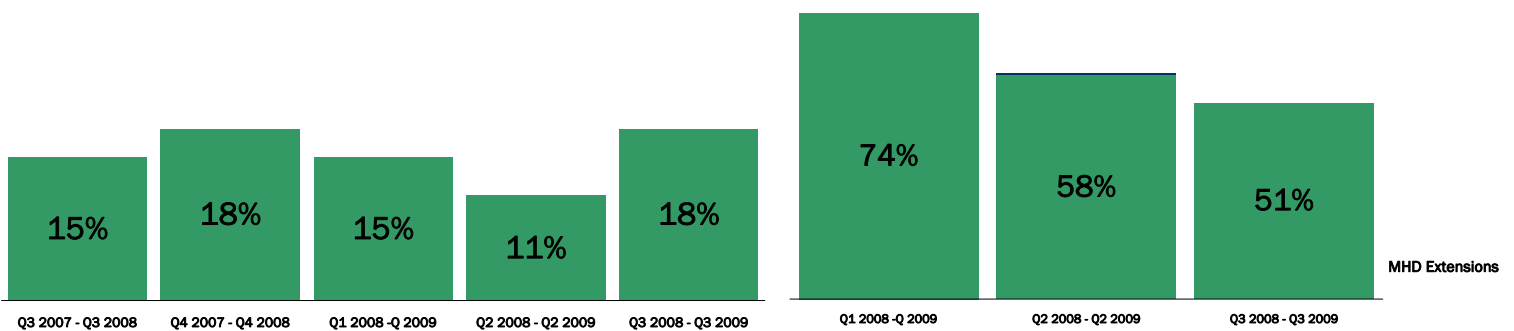
## Construction Completion Report

These pages provide a report on MassHighway's adherence to time and budget schedules.



This chart provides an overview of actual project completion dates compared to scheduled completion dates. In the last 12 months, 103 projects were completed by MassHighway. 19 projects were completed on or ahead of schedule without time extension. Cumulatively, 59 projects (57%) were completed within one year of their original schedule. Cumulatively, 87 projects (84%) were completed within two years of their original schedule. As part of MassHighway's streamlining efforts, we are working hard to complete more projects within original schedules. On projects where delays occur, we will limit those delays so that projects are completed as close to original schedules as possible.

## Performance Overview

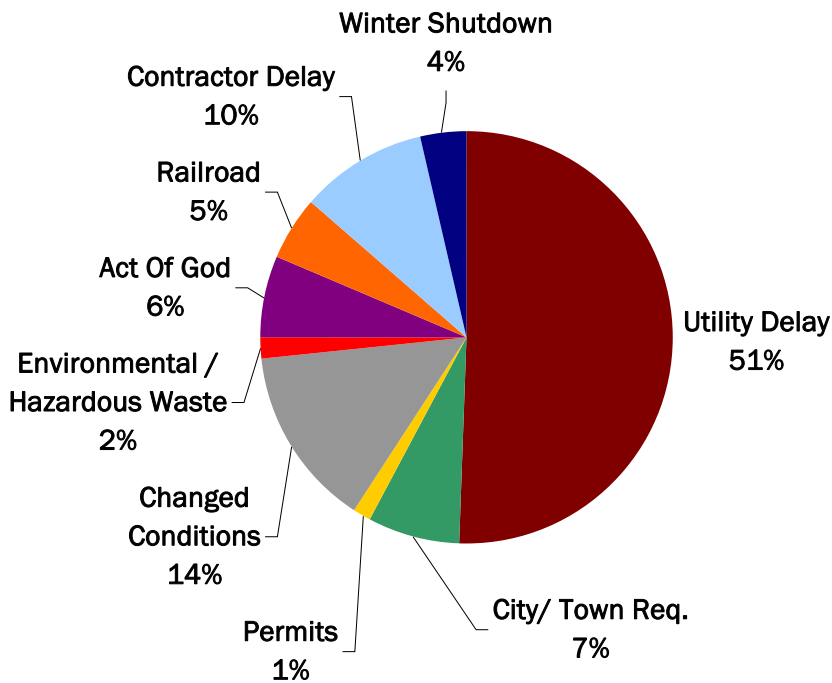


18% of MassHighway projects completed in the last year received no time extension, a slight increase from 11% in the previous year. 49% of time extensions were for external factors, beyond MassHighway control. 51% of projects received extensions for reasons caused by MassHighway.

# SPOTLIGHT ON PROJECT DELIVERY

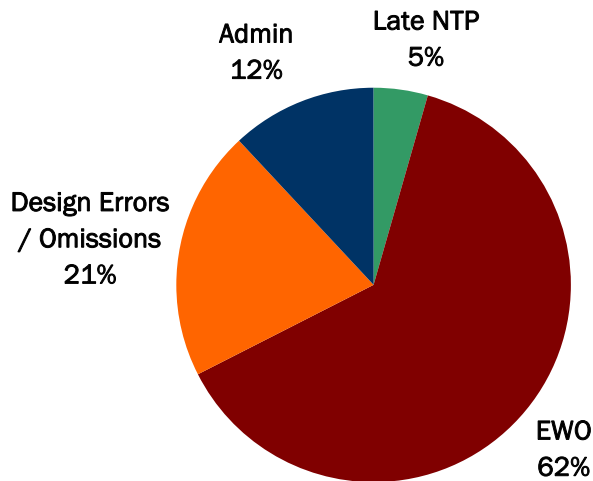
## Construction Time Extension Report

### Causes of External Extensions



This chart breaks out the causes and frequency of external delays to the construction process in the past 12 months. As shown, the most frequent cause of approved schedule extensions was associated with a utility company's need to relocate their poles, wires, and equipment. The second leading cause of external delays is for changed conditions (usually subsurface conditions). The third leading cause of external extensions is requests from municipalities for new elements to be included in projects. Other causes include winter shutdown.

### Causes of MassHighway Extensions



This chart breaks out the causes and frequency of MassHighway delays to construction projects completed in the past year. As shown, the primary reason for internal construction delays was the need for Extra Work Orders, additional work required to complete the original design which was not included in the contract.

Other causes include design errors and omissions, and administrative delays. As part of the construction streamlining effort, MassHighway will significantly reduce the number and extent of project delays regardless of cause. MassHighway will also focus on improving the quality of design, whether that design is overseen by MassHighway or a local government.

# SPOTLIGHT ON PROJECT DELIVERY

## MassHighway Initiatives to Improve Project Delivery

- **MassHighway has implemented the use of flaggers** instead of paid police details on construction projects saving taxpayers thousands of dollars.
- **Administrative Streamlining has meant re-engineered schedules and procedures** which eliminate unnecessary steps and guarantee turnaround times.
- **Construction Streamlining has meant improved project delivery.** MassHighway has already taken the following steps:
  - Process re-engineering.
  - Electronic Scheduling of projects.
  - Expanded Hours of Work to complete projects sooner.
  - Constructability Engineers to identify potential design problems before construction begins, reducing delays over the long run.
  - Incentive-Disincentive Contracts to increase timely project completion.
  - Project bundling that groups similar projects together resulting in efficiency gains.

## Construction Program Highlights

### Grafton - Pleasant Street over the Blackstone River

This \$4.2 million dollar bridge replacement project is the first Design/Build project under the historic \$3 billion, eight-year Accelerated Bridge Program. The work involves complete replacement of a two-span stone arch bridge with a new two-span precast arch structure. The project is on an aggressive accelerated schedule, with less than five months allowed between Notice to Proceed and completion. The work includes complete demolition, new pile supported foundations, precast arches and walls and reuse of the historic stone facing as a veneer on the new structure. The contractor was ahead of schedule and expected to meet the June completion deadline.

### Boston/Chelsea – Chelsea Street. Bridge

A notice to proceed was issued on October 28, and work physically started on November 12, on this \$125 million bridge replacement project. The completion date is April 6, 2012 and the project is on schedule. Work continued through the winter with installation of a steel cofferdam for the northeast tower support. The first of 27 massive five-foot diameter drilled shafts was installed and tested. These shafts are drilled deep into the bedrock to ensure stability. Utility relocations have been successfully performed and all temporary relocations have been completed. Work will continue on the drilled shafts and massive tower footings throughout the 2009 construction season. In addition to the work going on in the field, a significant effort has been on-going offsite at various fabrication plants to complete shop drawings and to order the steel for the mechanical and structural elements of the new lift bridge. There is significant coordination between MassHighway, the City of Boston, the project designer, consultant, contractor J.F. White, and their various steel fabricators including PDM (Pittsburgh-Des Moines) Bridge and Steward Machinery. Construction of the project is 5% complete.

### Two Route 8 Bridge Replacements – Dalton

Both of the new bridges were opened this construction season **more than one year before the original completion date** of March 15, 2010. This \$4.5 million project is 94% complete. Minor work will be completed in the Spring and the project will formally end by July 1. Route 8 is a primary north/south roadway in Berkshire County and a major link to metropolitan areas in Connecticut. The Contractor is J.H. Maxymillian of Pittsfield.

### Route 2 over the Deerfield River (Indian Bridge) – Charlemont

The second phase of this \$4.7 million bridge rehabilitation was completed in the fall and the bridge was opened to full width traffic. Remaining work includes steel stringer painting and final paving. The project will be complete by July 1, well before the contract completion date of April 6, 2010. Route 2 is a scenic roadway (Mohawk Trail) connecting Northern Berkshire County with Greenfield to the east and New York state to the west.

# SPOTLIGHT ON PROJECT DELIVERY

## **Main Road Reconstruction - Tyringham**

Work on this \$3.6 million project began in March. The contractor, C&A Construction Company of Ludlow, is considering an alternative construction method for replacement of the large culvert to expedite completion. The current completion date is 10/12/2010. In 2005, the District 1 office assumed responsibility for the design to make the project more context sensitive and reduce environmental impacts. The redesign process followed the 2006 MassHighway Design Guide, nationally recognized for its emphasis on multi-modal, environmentally friendly design. The work consists of reconstruction of Main Road from the intersection with Monterey Road southeasterly to the intersection with Barnes Road, a distance of approximately 2.1 miles.

## **Springfield Route 5 over Connecticut River/ South End Bridge preservation**

This Accelerated Bridge Program project is a \$6.8 million preservation/repainting of the South End Bridge between Agawam and Springfield. Work was authorized to begin in October 2008. The work includes repainting of the bridge truss girders, deck stringers, and bracing. The bridge was recently repaired as part of a \$29.4 million repair contract by Cianbro Corporation, completed in April 2007. The deck joints were repaired along with steel repairs throughout the structure and a portion of the bridge steel at the joints was cleaned and painted. The current project will provide for the repainting of remaining structural steel to preserve its integrity. The completion date is October 2010.

## **Brightman Street Bridge over Taunton River – Fall River/Somerset**

The nearly \$175 million replacement of the Brightman Street Bridge is MassHighway's largest active project. Construction is taking place in four phases; the fourth and final contract is underway. The project will relocate Route 6 over the Taunton River connecting Fall River and Somerset. The project involves construction of a double-leaf bascule type mechanical bridge with a vertical clearance of 60 feet from the water surface in the closed position and a 200-foot horizontal clearance between the fender beams for navigational traffic. The new bridge is approximately 1700 feet long from the east abutment in Fall River to the west abutment in Somerset. The Brightman St. Bridge is one of the largest bridges in Massachusetts.

The new structure will be located approximately ¼ mile north of the 103 year-old existing bridge. The existing bridge has weight restrictions as well as limited vertical and horizontal clearances. The bridge has an average daily traffic count of 45,000 vehicles per day and, because of the vertical clearance restrictions, must be opened frequently, causing traffic backups.

The new bridge replacement project was split into 4 separate contracts with the following breakdown of work and current status:

- **Contract #1:** Construction of approach roadway embankments in Somerset and preload areas in Fall River. The work also included tree planting and wetland mitigation. This work was completed in July 2000. The general contractor was D.W. White Construction Company. Cost: \$2.3 Million.
- **Contract #2:** Construction of the bridge's main substructure, bascule fender systems and all pier protection cells; construction of the embankment and retaining walls. The work was completed in September 2006. The general contractor was Jay Cashman Inc. Cost: \$45 Million.
- **Contract #3:** Construction of the two-basculer piers and an embankment area in Fall River. The work was completed in July 2006. The general contractor was Modern Continental Corporation of Cambridge, Massachusetts. Cost: \$38 Million.
- **Contract #4:** Construction continues on the east and west basculer piers and approach spans. All the large tub girders have been erected over the Taunton River and the contractor has completed the first deck pour on the west approach. The basculer girders and structural steel components for the southeast basculer will be delivered via barge to the work site in August for immediate erection. Three more deliveries will follow over the next ten months. The contract is 57% complete.

The nearly \$175 million replacement of the Brightman Street Bridge is MassHighway's largest active project.

# SPOTLIGHT ON PROJECT DELIVERY

## Construction Project Concern List

The following list makes note of projects with cost or schedule concerns.

### **Falmouth – Water Street bridge over Eel Pond – Contract #45509**

This \$7.6 million project consists of a bascule (movable) bridge replacement which carries Water Street over Eel Pond Channel. This project contained a milestone date of May 15<sup>th</sup> for the opening of the new bascule bridge and approach roadways. Over the past six months the general contractor and their subcontractors have been working extended hours and utilizing additional work crews to meet this date. The roadway and bridge will be opened to traffic as scheduled. The remaining work which includes the removal of the movable pedestrian bridge, pile supports, and punch list items will be completed before the September 12, 2009 completion date. Construction on this project is roughly 95% complete.

### **Hanover – Route 53 Reconstruction from Mill to Pond streets – Contract #52997**

This \$4.8 million project includes reconstruction and widening of Washington Street (Route 53) to accommodate two travel lanes in each direction and a two-way center left turn lane, for a distance of approximately 7000 feet (1.5 miles). The contractor resumed work last month and is currently performing full-depth roadway reconstruction, curb installations, sidewalks, and traffic signal installations. Utility relocation work is ongoing throughout the project. The project is 52% complete.

### **Richmond - Sleepy Hollow Road bridge replacement**

#### **Contract #52128**

Work resumed in March and substantial progress has been made on this \$1 million project. Construction was suspended in June after extensive abutment deterioration was discovered. The project is on target to be completed prior to the completion date of 9/13/09. The existing bridge spans the CSX RR. The Contractor is Clayton Davenport Trucking of Greenfield.

# SPOTLIGHT ON HIGHWAY MAINTENANCE

Maintenance improves the overall condition of our roadways. The following are a few examples of how maintenance improves the condition of our roadways:

- Cleaning catch basins helps eliminate the potential for roadway flooding.
- Tree trimming enhances the visibility of road signs and traffic signals, improves highway lighting effectiveness and reduces the clogging of basins by leaves and tree limbs.
- Tree trimming enhances sightlines and access to interchanges and at intersections.
- Replacement of pavement markings and signs enhances the visibility of these markers making roadways safer.

Improved maintenance has benefits for the environment as well. Clean catch basins do not discharge sand, which chokes the natural habitats and wetlands that abut the state highway system. Selective clearing and mowing of roadsides reduces the potential for harmful invasive plant species to cause damage.

Maintenance work can be completed relatively quickly relative to other types of work including reconstructions and replacements. By focusing on maintenance, traffic and congestion can be reduced saving commuters both time and money while yielding important air quality benefits.

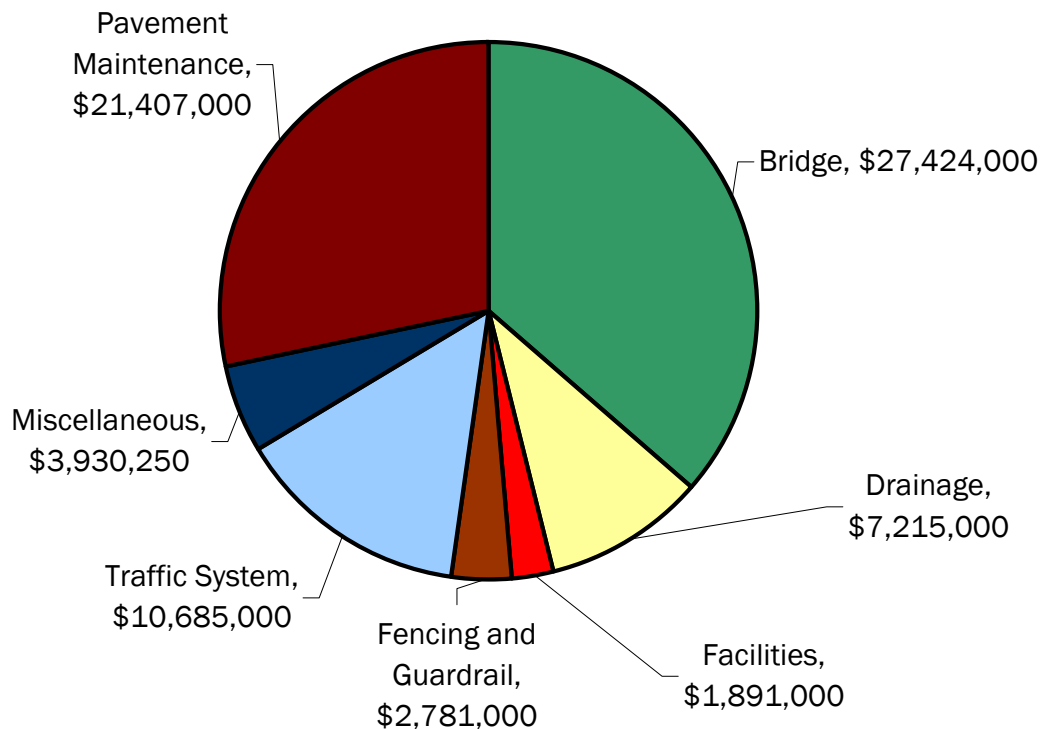
Lastly, an investment of 10 cents in highway and bridge maintenance results in over a dollar of long-term capital savings by prolonging the useful life of major infrastructure.

## MASSACHUSETTS STATE HIGHWAY SYSTEM

2,849 Linear miles  
8,756 lane miles  
2,899 Bridges  
82,000 Catch Basins  
400,000 Signs  
10,000 Mowable Acres  
3,696,000 Linear feet of guardrail  
1,200 Traffic Signals  
700 Flashing Beacons  
6,500 Lighting Units

In January 2008, MassHighway established the position of Director of Highway Maintenance. The driving force behind the creation of this position was a need to better focus on maintenance of MassHighway roads, bridges, and other facilities. This increased focus on maintenance will both save money and improve our highway network over the long term. With the creation of this new position, an initial investment of \$50 million was planned for FFY 2008. Ultimately, \$87 million was invested in maintenance.

## Breakdown Chart of Maintenance Spending by Activity



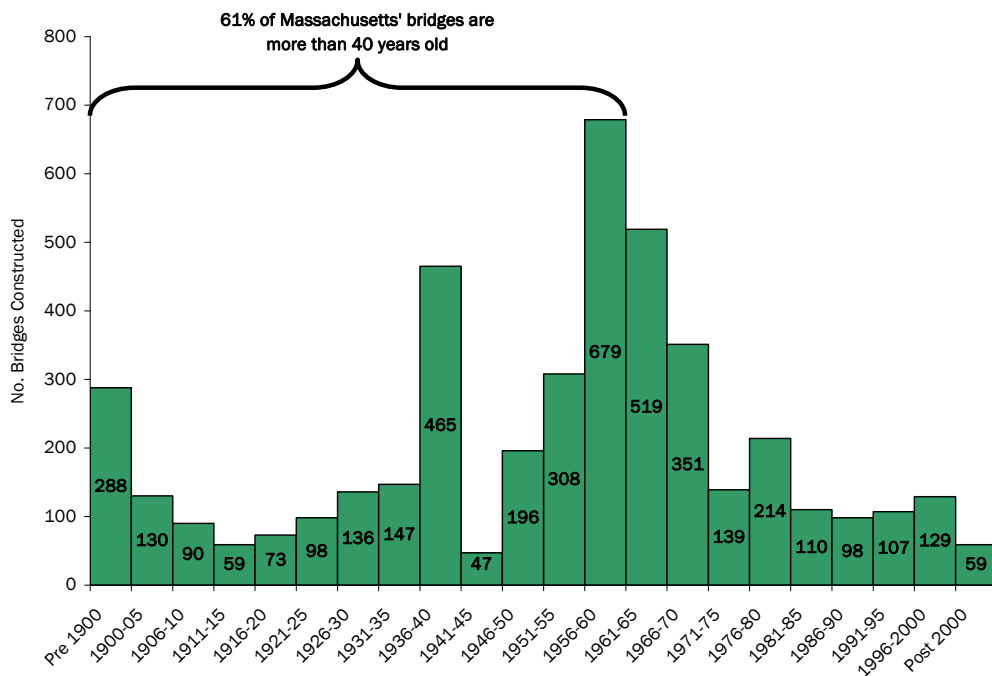
# BRIDGE CONDITION REPORT

Massachusetts' bridges are the centerpiece of the Commonwealth's infrastructure. MassHighway owns over 2,800 bridges across the Commonwealth, and inspects 1,547 municipally owned bridges at least every two years. The continued maintenance of Massachusetts bridges is vital to continued mobility for people and goods. This report provides an overview of bridge conditions across the Commonwealth.

## The Massachusetts Perspective

Massachusetts is one of the oldest settled areas in the United States, so, not surprisingly, we also have some of the oldest infrastructure. The age of Massachusetts bridges coupled with New England's rough winters has created a situation where our bridges require substantial focus and attention.

## Bridge Construction 1900—Present



61% of Massachusetts' bridges were built by 1961. The vast majority of these bridges were built either by the Works Progress Association during the Great Depression, or as part of the construction of the Interstate Highway System. 42% of the Commonwealth's bridges are between 40-60 years old. As a result of their age, many bridges have reached the end of their useful life and are in need of significant investment.

## The Accelerated Bridge Program

This August, Governor Patrick signed legislation creating the Accelerated Bridge Program. The Accelerated Bridge Program represents a monumental and historic investment in Massachusetts bridges. Over the next 8 years, nearly \$3 billion in funding will be accelerated to improve the condition of bridges in every corner of the Commonwealth. This program will greatly reduce the number of structurally deficient bridges in the state system, while creating thousands of construction jobs on bridge projects. For detailed information about the Accelerated Bridge Program and a list of planned projects please visit [www.mass.gov/acceleratedbridges](http://www.mass.gov/acceleratedbridges). By March 2009, MassHighway has advertised more than \$200 million for 43 Accelerated Bridge projects across the Commonwealth.

## Bridge Inspection Program

MassHighway inspects over 4,400 bridges at least every two years. These inspections help MassHighway to determine which bridges need the most attention and understand the overall condition of Massachusetts bridges.

Bridge Inspection Teams examine and analyze every element of the bridge, assigning each with a condition rating on a scale of 0 to 9 (with 9 being "excellent" and zero being "imminent failure"). For all bridges with footings in the water, underwater inspections are conducted using specially trained MassHighway dive teams.

After the inspection is performed, all data, sketches, photos, and videos are entered into MassHighway's nationally used, state-of-the-art Bridge Inspection Management System Database. In 2007, MassHighway bridge inspectors conducted 2,817 bridge inspections.

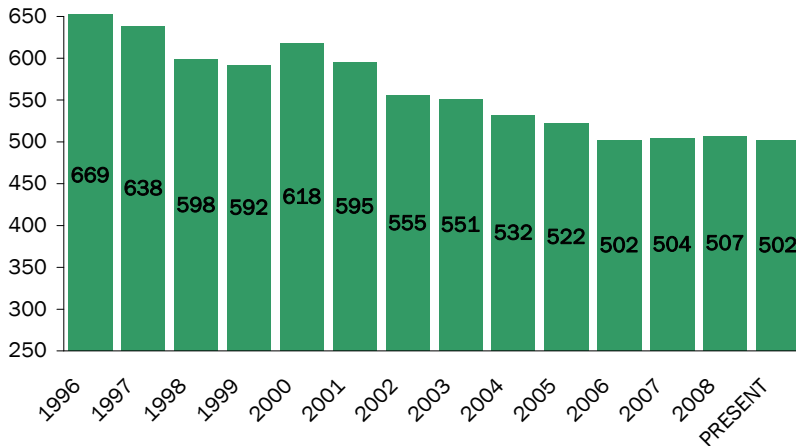
# BRIDGE CONDITION REPORT

## Structurally Deficient Bridges Report

One of the most prominent measures of bridges is whether or not a bridge is structurally deficient. A structurally deficient (SD) bridge is one for which the deck (driving surface), the superstructure (supports immediately beneath the driving surface), or the substructure (foundation and supporting posts and piers) are rated in condition 4 or less on a scale of 1-10. Structural deficiency does not necessarily imply that a bridge is unsafe. It does, however, mean that a structure is deteriorated to the point of needing repairs immediately to prevent restrictions on the bridge.

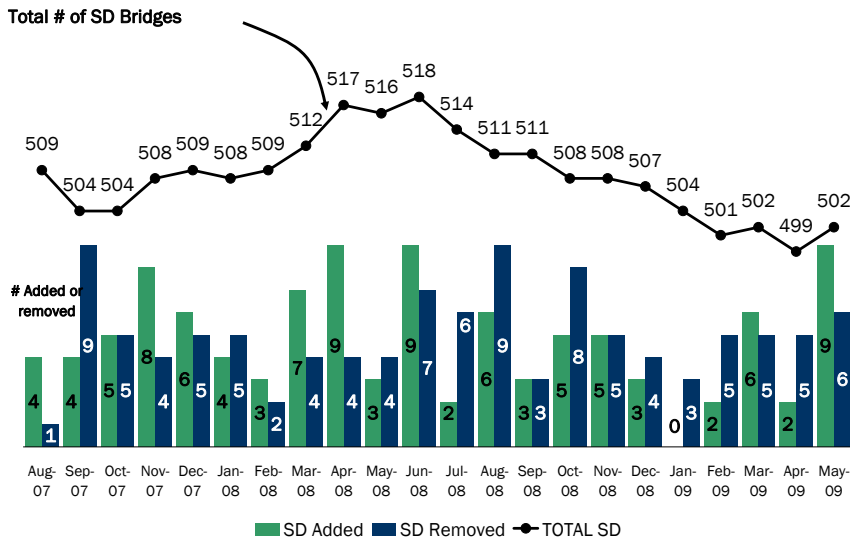
## Trend of Structurally Deficient Bridges 1998-Present

Number of SD Bridge (1996-Present)



From 1998 to 2006, the number of structurally deficient bridges dropped from 598 to 502 as shown in chart A. These improvements reduced the percentage of SD bridges in the state from 14% to 11%. Since 2006, the number of structurally deficient bridges in Massachusetts has remained relatively constant.

## Number of SD Bridges Added vs. SD Removed – August 2007 to Present



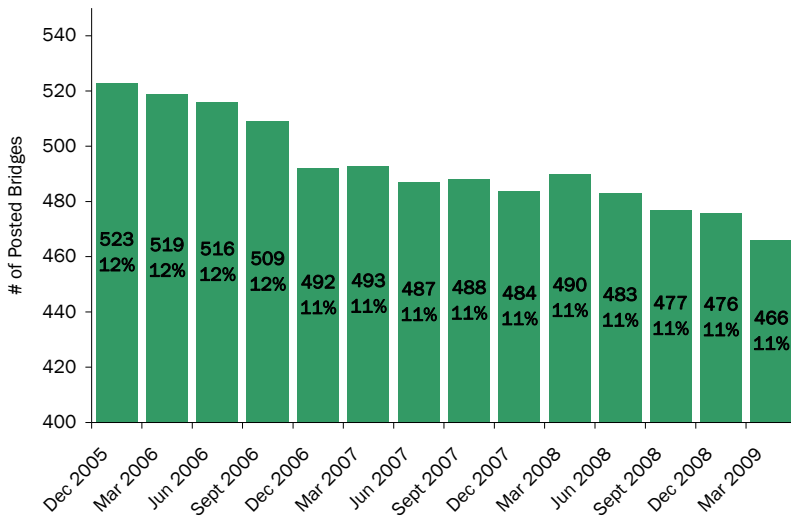
This chart shows the number of bridges that became structurally deficient and the number of bridges that were removed from the list of structurally deficient in each month since August 2007. As this chart indicates, through June 2008 bridge became structurally deficient at a faster rate than MassHighway was able to remove bridges from structurally deficient status. This trend is due in large part to unmet maintenance needs on many of Massachusetts' bridges, especially older bridges. In August 2008, Governor Patrick signed the Accelerated Bridge Program into law to reverse this trend.

To improve bridges, Massachusetts must work to simultaneously remove bridges from Structurally Deficient status, while also precluding others from falling into Structural Deficiency. For every bridge we are able to remove from the list of structurally deficient bridges, 1.1 bridges become structurally deficient.

To remove bridges from structurally deficient status, costly bridge rehabilitation and reconstruction projects may be required. It is more cost effective to prevent bridges from reaching structural deficiency. To do this, bridge preservation projects are required. Bridge preservation includes extensive bridge painting projects to protect steel elements from corrosion, abutment repairs to repair spalling (deteriorated concrete), as well as deck and deck joint replacements to prevent water from entering the superstructure.

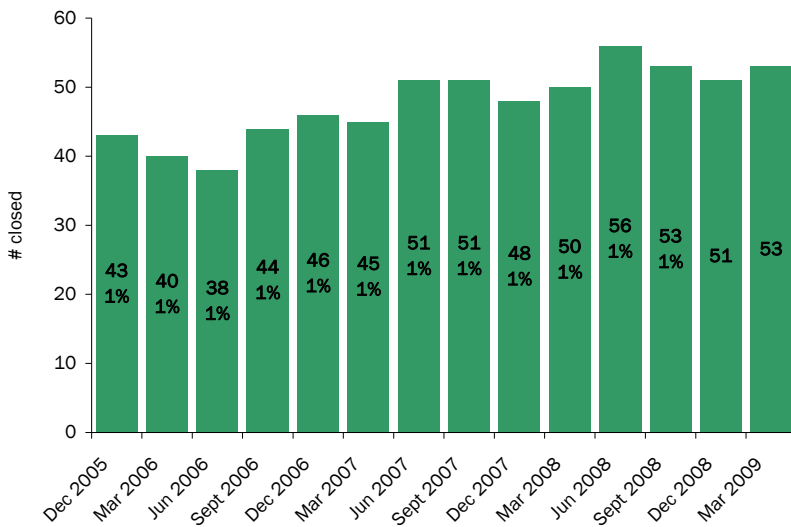
# BRIDGE CONDITION REPORT

## Massachusetts Posted Bridges



When an engineering evaluation determines that the carrying capacity of a bridge is less than the Massachusetts statutory load, that bridge is posted with a weight restriction. 466 of Massachusetts bridges are currently posted. MassHighway's bridge section has a program to address posted bridges which focuses first on numbered routes. Numbered routes receive the most traffic and hold the most significance to Massachusetts transportation network.

## Massachusetts Closed Bridges



53 of Massachusetts bridges are currently closed. For a bridge to be closed, it must have deteriorated to such a deficient condition that it has been determined to be unsafe for traffic. For these bridges to be re-opened, rehabilitation or complete replacement is required.

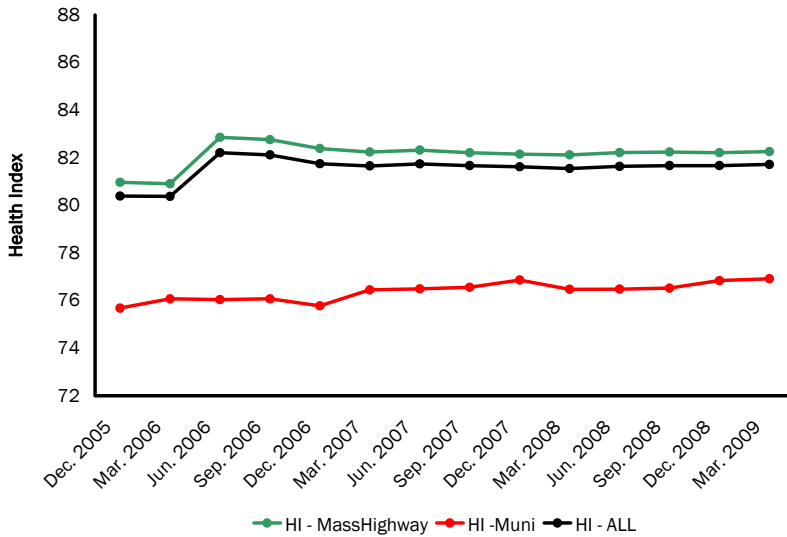
# BRIDGE CONDITION REPORT

## Bridge Health Index Report

MassHighway also measures bridge condition with Bridge Health Index. Bridge Health Index is the ratio of the current condition of each element to perfect condition expressed as a score from 0 to 100, with a value of zero indicating all of particular bridge's elements to be in the worst condition. A bridge health index of 85 would indicate that the condition of a system of bridges to be good. MassHighway's goal is to achieve a bridge health index of 85 or greater. Health Index is especially useful to characterize the physical condition of a bridge or set of bridges. Health Index provides MassHighway bridge engineers with a way of assessing the overall conditions of all bridges, or subsets of bridges, in Massachusetts.

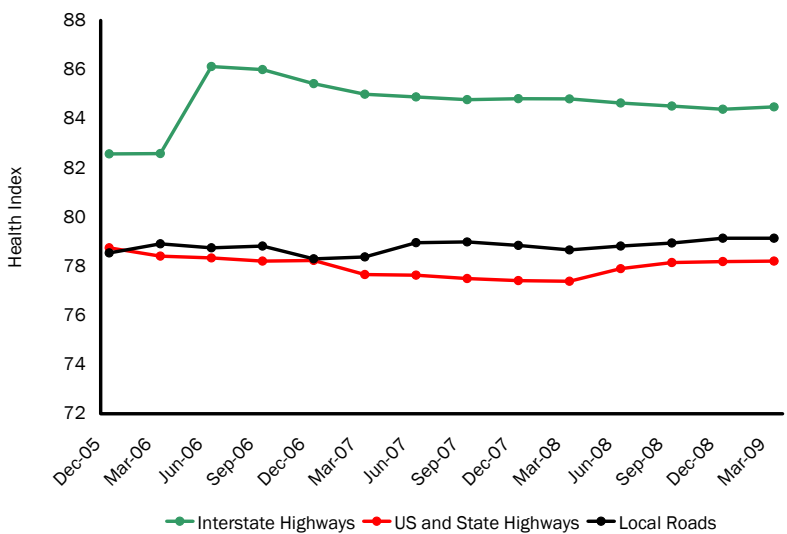
Massachusetts overall bridge health index is 81.64. MassHighway is working to reach an overall bridge health index of 85 in Massachusetts. A health index of 85 would indicate the system of bridges in Massachusetts to be in good condition.

## Health Index By Bridge Owner



The above chart shows a comparison the health index of bridges owned by MassHighway, Municipalities, and on a whole. MassHighway owned bridges have a health index of 82.26 while municipality owned bridges have a health index of 76.92.

## Health Index By Road Category



The above chart shows a comparison the Health Index of bridges on Interstates, US and State Highways, and local roads. The condition of bridges on the interstates is higher than the condition of US, State, and Local Roads. These better condition of bridges on the interstate system is attributed to the increased focus and funding assistance for Interstate Bridges.

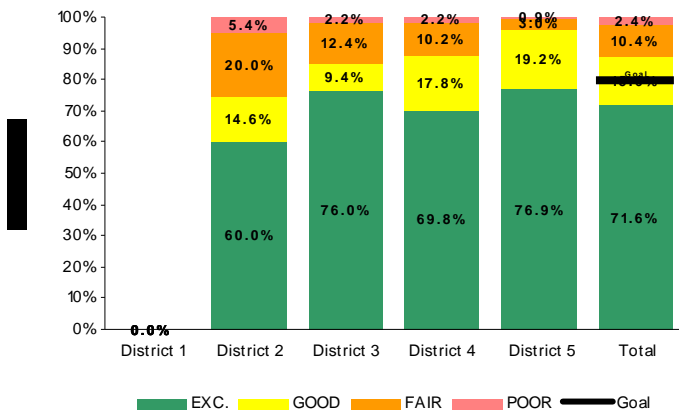
# PAVEMENT CONDITION REPORT

MassHighway measures the condition of pavements on the Interstate System, the National Highway System, all other roads under MassHighway jurisdiction, and on state-numbered routes not under MassHighway jurisdiction. In Massachusetts, the NHS is comprised of the entire Interstate Highway System (435 centerline miles, 2,525 lane-miles, not including the Turnpike), other major highways such as Route 3 and Route 24, and some major arterial roads such as Routes 9 and 20, for a total of 1,829 centerline miles and 6,715 lane-miles of highway. Overall, MassHighway collects and analyzes data on approximately half of the 11,129 federal-aid eligible roadways.

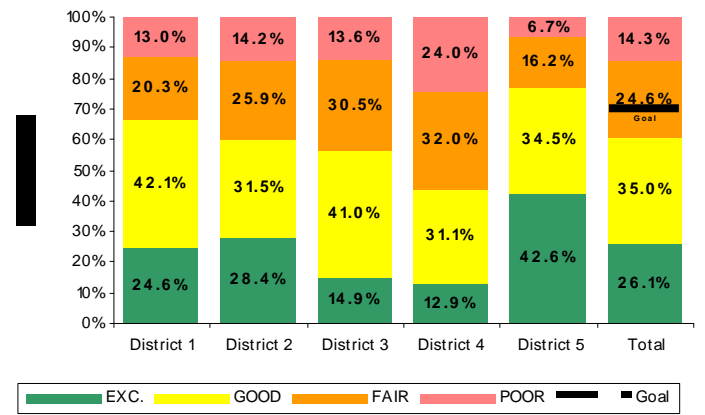
Pavement data is collected and evaluated using MassHighway's special high-tech vehicle, the Automatic Road Analyzer, or ARAN, on a bi-annual cycle. The ARAN measures pavement roughness (International Roughness Index, or IRI) as well as indicators of pavement distress such as cracking, rutting, and raveling, and then combines them all into an overall pavement condition indicator (Pavement Serviceability Index, or PSI).

## CURRENT CONDITION OF THE NATIONAL HIGHWAY SYSTEM: PSI

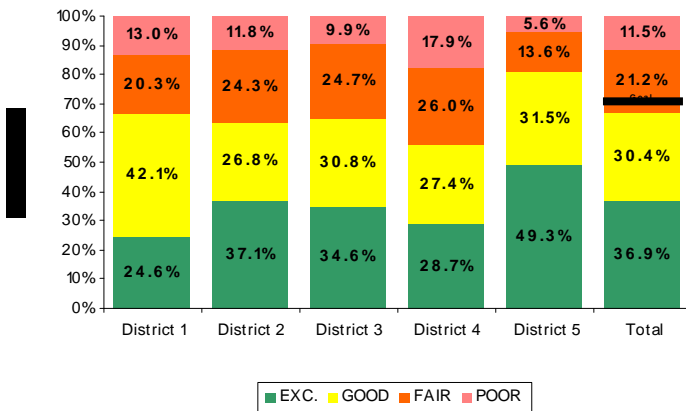
PSI By District: Interstate System



PSI By District Non-Interstate NHS



PSI By District Full NHS



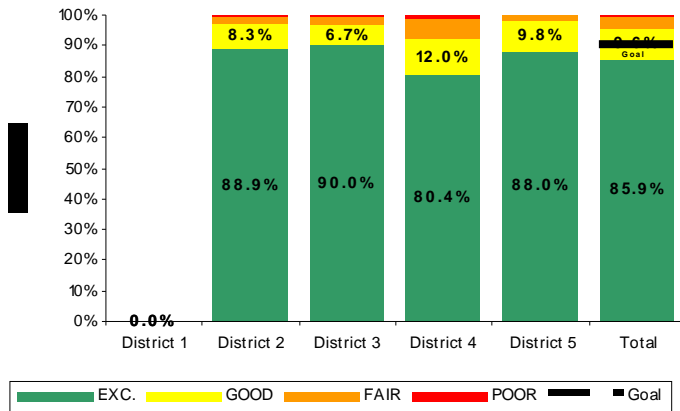
These three graphs show the current condition – based on PSI – of the Massachusetts Interstate System, the non-Interstate portion of the National Highway System, and the total NHS, for each of the five MassHighway Districts.

As shown, 87.2% of the Interstate system is in Excellent or Good condition, exceeding the MassHighway goal of 80%. For the non-Interstate portion, 61.1% is in Excellent or Good condition. For the total NHS system, 67.3% is in Excellent or Good condition, slightly below the MassHighway goal of 70%. MassHighway is responsible for the entire Interstate system, excluding the Massachusetts Turnpike (I-90), and about two-thirds of the non-Interstate NHS system.

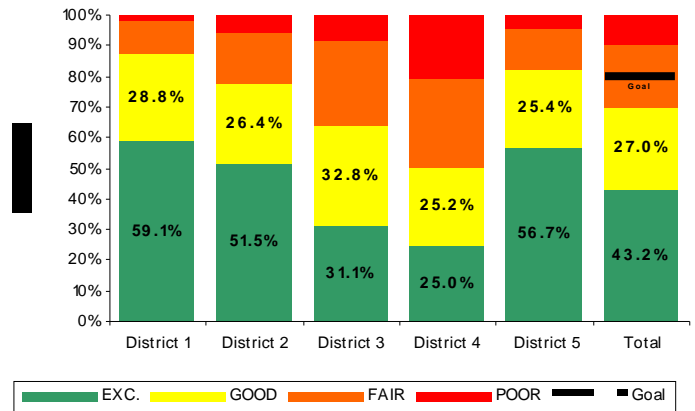
# PAVEMENT CONDITION REPORT

## CURRENT CONDITION OF THE NATIONAL HIGHWAY SYSTEM: IRI

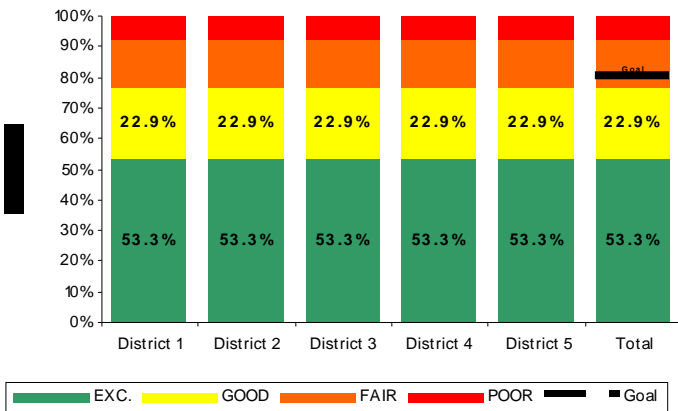
Interstate System - IRI by District



Non-Interstate NHS System - IRI by District



Total NHS - IRI by District



These three graphs show the current condition – based on IRI, a measure of pavement smoothness – of the Massachusetts Interstate System, the non-Interstate portion of the National Highway System, and the total NHS, for each of the five MassHighway Districts.

As shown, 95.5% of the Interstate system is in Excellent or Good condition, exceeding the MassHighway goal of 90%. For the non-Interstate portion, 70.2% of pavements are in Excellent or Good condition. For the total NHS system, 76.2% of pavements are in Excellent or Good condition, exceeding the MassHighway goal of 80%.

## Interstate Maintenance and the National Highway System Preservation Program

MassHighway's has implemented two significant annual efforts to improve pavement condition on major roads in the state: the Interstate Maintenance Program and the National Highway System Preservation Program.

The annual IM Program is comprised of several projects that on interstate highways totaling \$75 million. Each year, the projects are selected after a careful analysis of measured pavement condition and expected deterioration using sophisticated pavement management computer models. Emphasis is placed on utilizing optimal pavement preservation techniques applied at the right time during the pavement life cycle to minimize total cost. In addition to pavement preservation, each of the IM projects includes improvements to other highway features such as bridges, guardrail, and drainage systems so that all the work on a particular portion of road is done at the same time, minimizing traffic impacts. Almost all IM Projects utilize SuperPave design techniques and apply an Open Graded Friction Course as the surface treatment to reduce road spray, increase safety, and reduce noise.

Similarly, the annual NHS Preservation Program is comprised of projects on the NHS system totaling \$15 million. The NHS includes non-interstate major highways such as

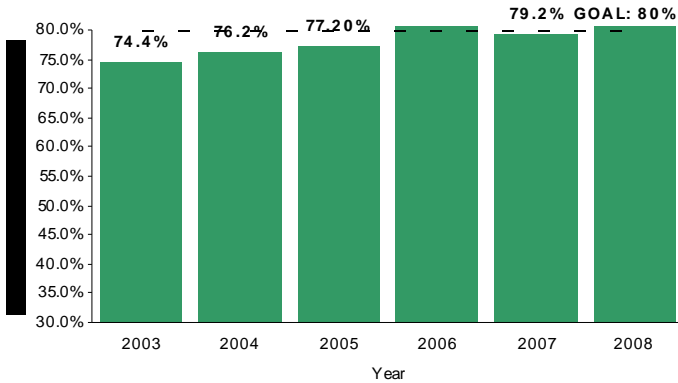
As part of the NHS Program, MassHighway has been testing several innovative pavement preservation strategies to improve effectiveness and reduce costs, including use of warm-mix asphalt, thin pavement overlays, recycled asphalt pavement, and pavement micro-milling, among other techniques.

**Whats New:** MassHighway plans to invest more than \$200 million in the NHS resurfacing this year, using funds from the American Recovery and Reinvestment Act (Stimulus). We will report on our progress using those funding in coming editions of the ScoreCard.

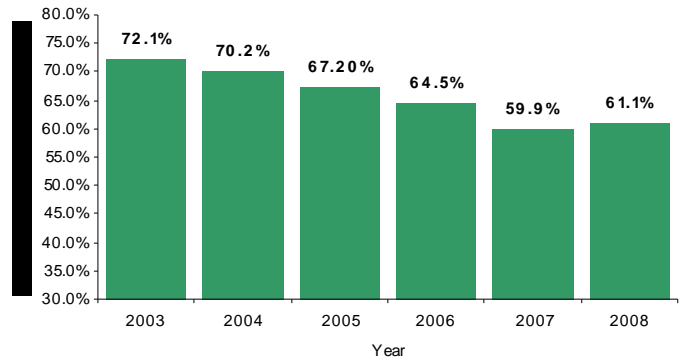
# PAVEMENT CONDITION REPORT

## PAVEMENT CONDITION TRENDS: PSI

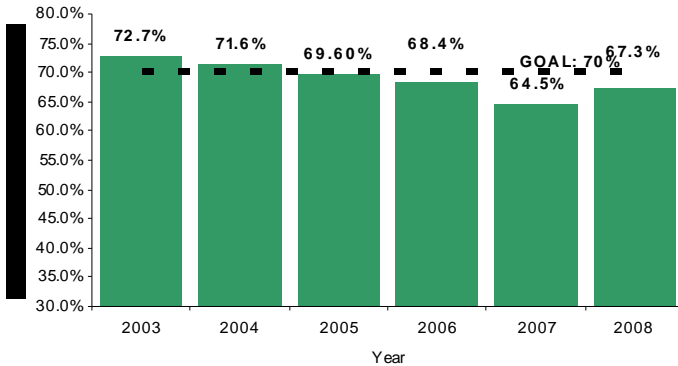
PAVEMENT CONDITION TRENDS OF THE INTERSTATE HIGHWAY SYSTEM (PSI)



PAVEMENT CONDITION TRENDS OF NON-INTERSTATE NATIONAL HIGHWAY SYSTEM (PSI)



PAVEMENT CONDITION TRENDS OF THE NATIONAL HIGHWAY SYSTEM (PSI)



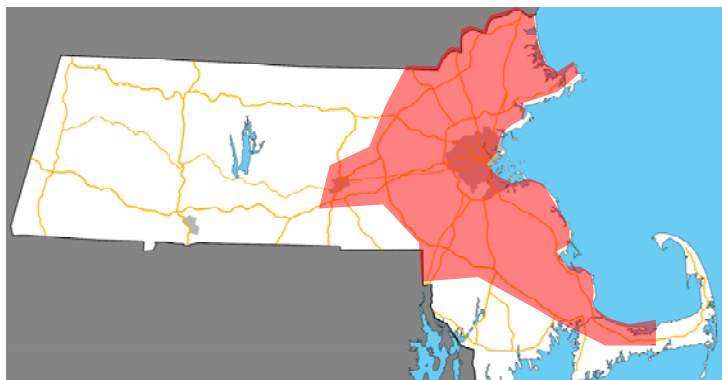
These three graphs show the five year pavement condition trends – based on PSI – of the Massachusetts Interstate System, the non-Interstate portion of the National Highway System, and the total NHS.

On the interstate system, there is a discontinuity between 2005 and 2006: the percentage of excellent increases from 47% or so in 2003, 2004, and 2005 to 61.6% in 2006. This is the result of technical issues which led to little data being collected in 2004 and 2005.

# SPOTLIGHT ON MOBILITY

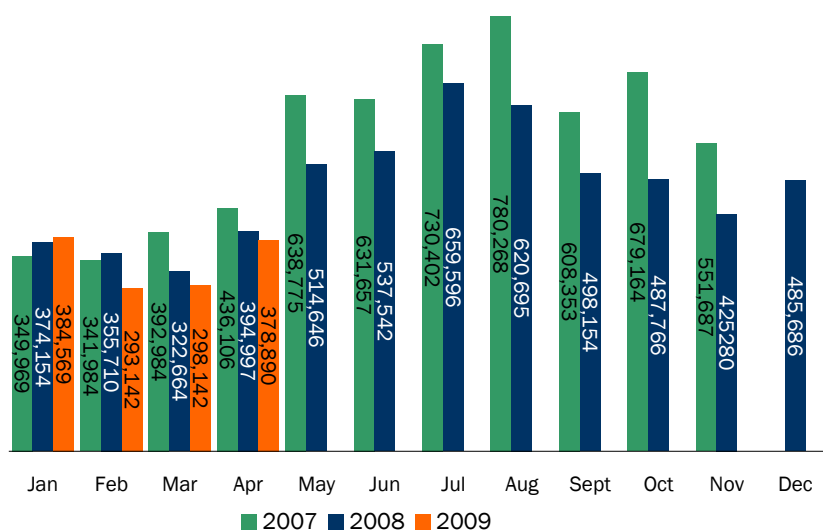
MassHighway, the Executive Office of Transportation, and the state's public safety agencies continue to make significant efforts to address and reduce congestion.

## Massachusetts 511 Traveler Information System

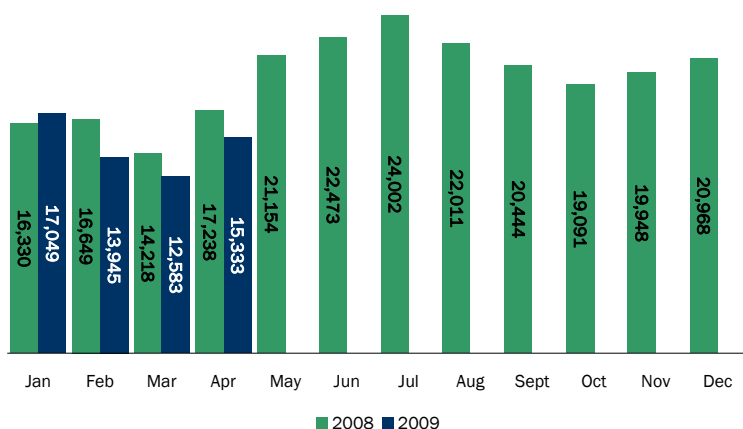


In October 2007, Massachusetts launched the 511 traveler information system, a 24 hour, free phone line providing commuters up-to-the-minute traffic condition data. 511 can be reached by simply dialing 5-1-1 from your mobile phone. Currently, 511 Massachusetts covers most of Eastern Massachusetts, from I-495 to Boston. The Massachusetts 511 system builds upon the successful travel information service previously accessed through SmarTraveler\*1 number. The 511 system also supports the Massachusetts Highway Hotline so citizens can report debris, hazards, or any roadway concerns on a 24 hour basis. Since the inception of the Massachusetts traveler information system in 1993, the service has received more than 67 million calls.

511 Massachusetts Coverage Area



**511 Call Counts:** The Massachusetts 511 traveler information system received 1,354,743 calls in the last quarter. This is a decrease in call volume compared to the same period last year.



**511 Average Weekly Call Volume:** The average weekday call usage was 19,948 in the month of November. The average weekday call volume has been relatively consistent in recent months.

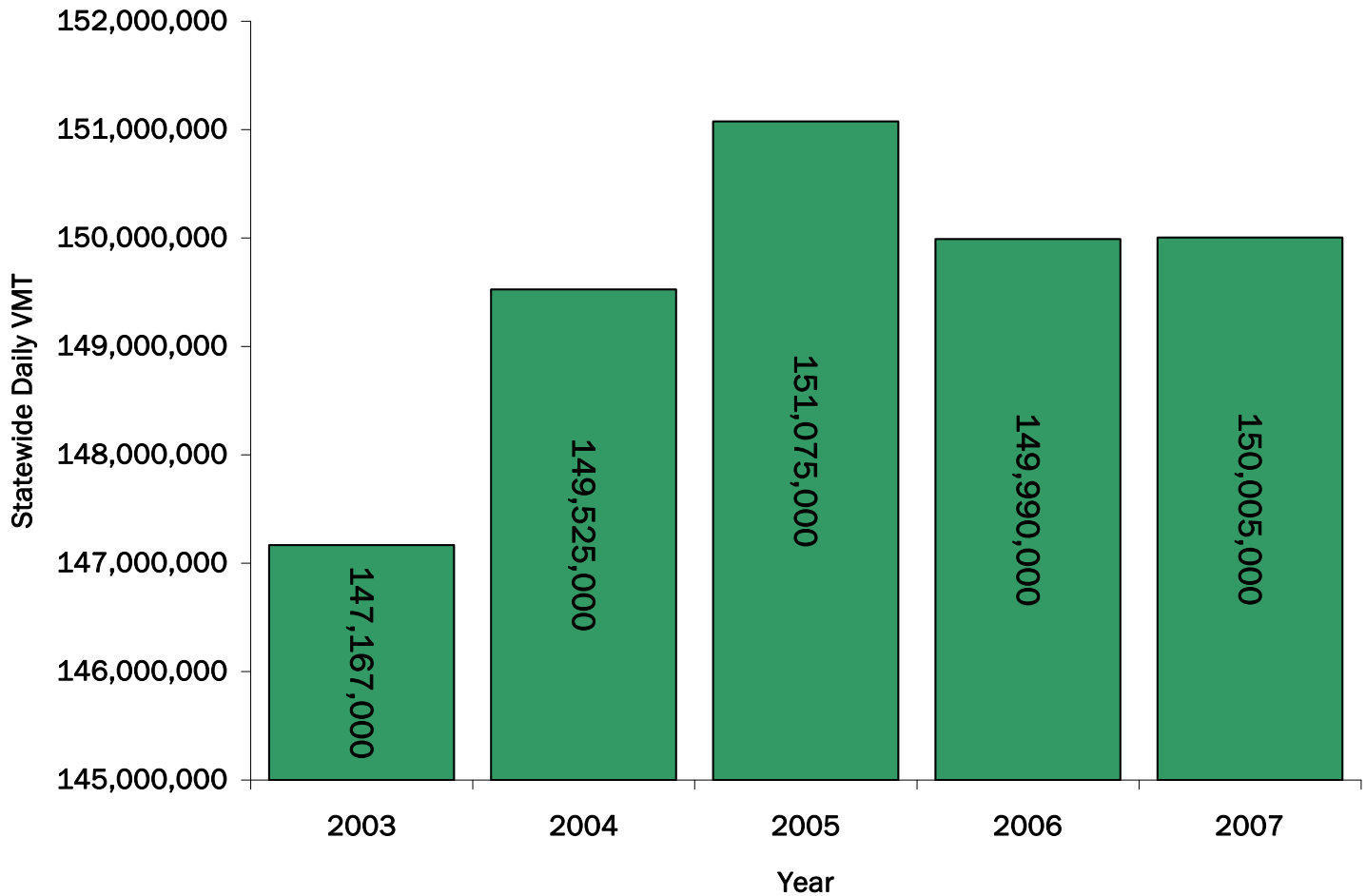
# SPOTLIGHT ON CONGESTION

This Spotlight on Congestion provides an overview of MassHighway's current and planned measures of throughput and congestion.

## Throughput

Currently, MassHighway annually estimates average daily vehicle miles traveled (VMT), which is a measure of total highway travel or throughput. The following chart shows statewide daily VMT estimates for the past five years:

Statewide Daily VMT (2003-2007)



## Congestion

It can be difficult and quite expensive to measure the severity, extent, and duration of highway congestion directly. Instead, measures of congestion are often extrapolated from traffic volume data.

MassHighway has used a performance measure called the *Volume to Practical Capacity* ratio to estimate the congestion-related performance of major highway facilities. At any highway location, this measure is calculated by dividing the estimated average weekday traffic volume by the daily practical capacity.

Daily practical capacity for limited access highways is assumed to be 20,000 vehicles per day per lane, which is roughly ten times the hourly capacity of such facilities. By definition, while the hourly traffic volume cannot exceed hourly capacity, over the course of the day daily traffic may exceed the daily practical capacity. (Cont.)

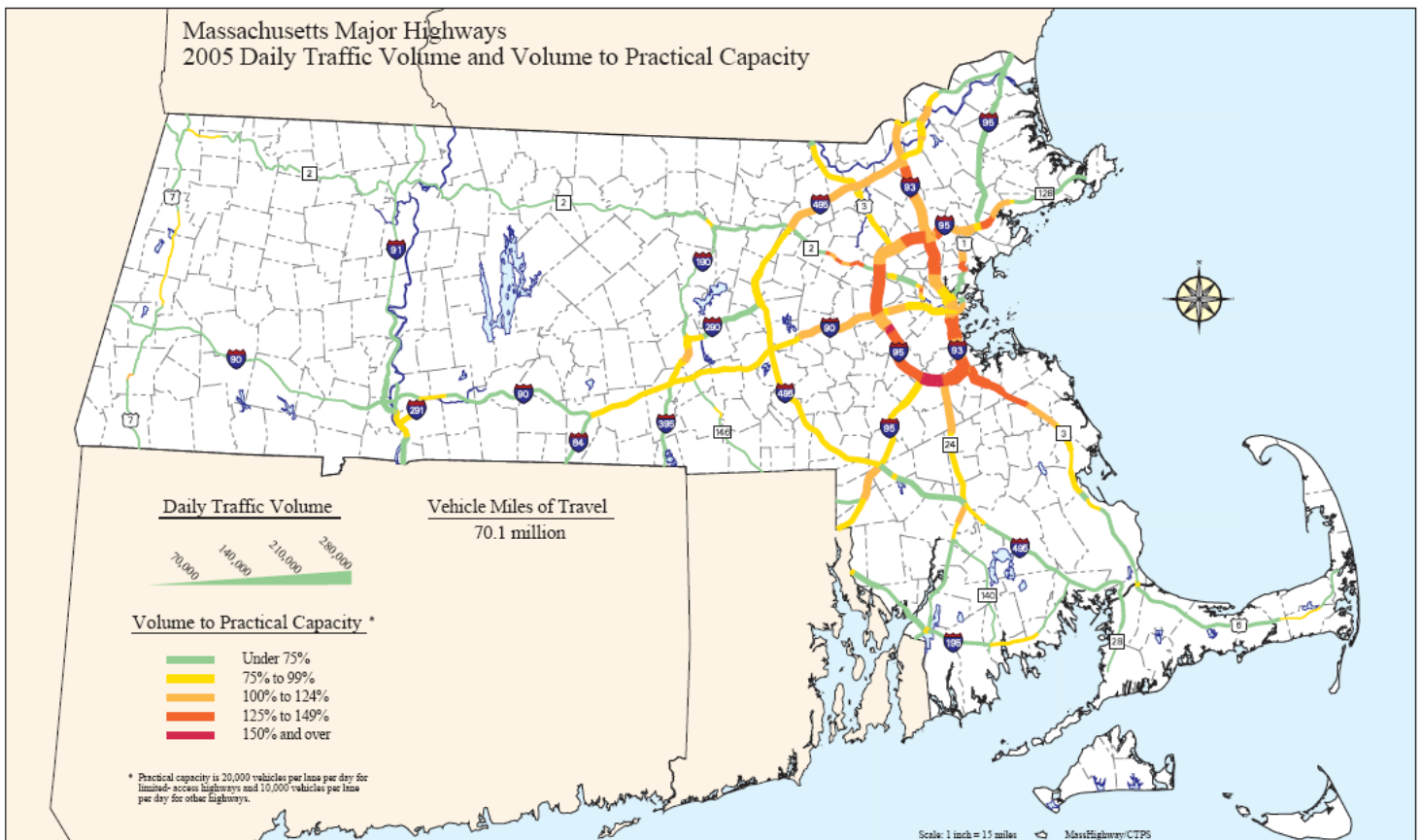
# SPOTLIGHT ON CONGESTION

Daily practical capacity is a useful benchmark for assessing roadway utilization because when daily traffic volume exceeds the practical capacity (that is when the ratio of daily volume to practical capacity exceeds 1.0) congestion of some magnitude occurs. As the ratio increases, the duration of congestion increases, as shown in the following table:

Ratio of Volume to Practical	Duration of Congestion (during each peak period)
Below 0.75	none
0.75 to 0.99	< 1.5 hours
1.00 to 1.24	1.5 to 3.0 hours
1.25 to 1.49	3.0 to 4.5 hours
Over 1.50	> 4.5 hours

It should be noted that congestion as defined here does not imply only stop-and-go traffic, but rather a range of conditions from traffic moving under near-capacity conditions to unstable traffic flow that may include stoppages and queuing.

At various time in Massachusetts, volume to practical capacity has been estimated at over 550 locations on major highways, using actual traffic counts or forecasted traffic volumes from travel demand models. The resulting data has been presented in graphic form, as shown in the attached graphic for 2005. However, volume to practical capacity has not been consistently calculated on an annual basis.



To meet the reporting requirements of Chapter 86, Section 5, regarding congestion, in 2009 MassHighway will begin to collect traffic volume at these 550 locations annually so that volume to practical capacity can be estimated and reported annually.