



# 5 Infrastructure







## INFRASTRUCTURE

### Introduction

Within the transportation system, the infrastructure that makes up and serves the roadway network is critical to its effectiveness and efficiency. Poorly maintained bridges, dams and pavement impact all aspects of movement, from commuting and recreational to freight and emergency services.

### Bridges

Throughout the Montachusett region, many of its roads travel over numerous brooks, rivers and water bodies. Within the 22 communities of the Montachusett planning area, some 317 bridges are identified and rated by MassDOT as part of their inventory system. MassDOT has provided a Bridge Rating Table to the MRPC that includes the town where the bridge is located, the road name the bridge is located on, the bridge identification number, functional classification of the road, year built, historical significance, rebuilt date (if applicable), AASHTO (American Association of State Highway and Transportation Officials) rating, and the deficiency status of each bridge, i.e. structurally deficient or functionally obsolete.

*Structurally deficient* bridges are the main concern in terms of repair priorities. A Structurally deficient bridge is not necessarily unsafe but is deteriorated to a point where it must be closely monitored and inspected or repaired. A bridge that is *functionally obsolete* is also not necessarily unsafe but may not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand.

In order to maintain an efficient movement of goods and people, a responsive and adequately funded bridge maintenance system is essential. Bridge closings and weight restrictions alter traffic patterns by forcing vehicles to find alternate routes frequently leading through residential streets. The result is increased congestion and pollution, potential loss of business, the potential for more accidents and failure of the emergency planning process.

### Montachusett Bridges – Current & Historical

Within the Montachusett Region, the 2010 Bridge Rating Table lists 60 bridges as functionally obsolete (FO) and 47 as structurally deficient (SD). This represents approximately 34% (107 of 317) of the Region's total bridges.

According to the MassDOT Accelerated Bridge Program website, "From 1996 to 2006, the number of structurally deficient bridges dropped from 669 to 502 ... These improvements reduced the percentage of SD bridges in the state from 15% to 11%. Since 2006, the number of structurally deficient bridges in Massachusetts has remained relatively constant. Recent investments in preservation are beginning to reverse the trend of adding to the SD inventory." Compared to the Commonwealth, 15% of the Region's bridges were identified as structurally deficient, slightly higher than the statewide average.

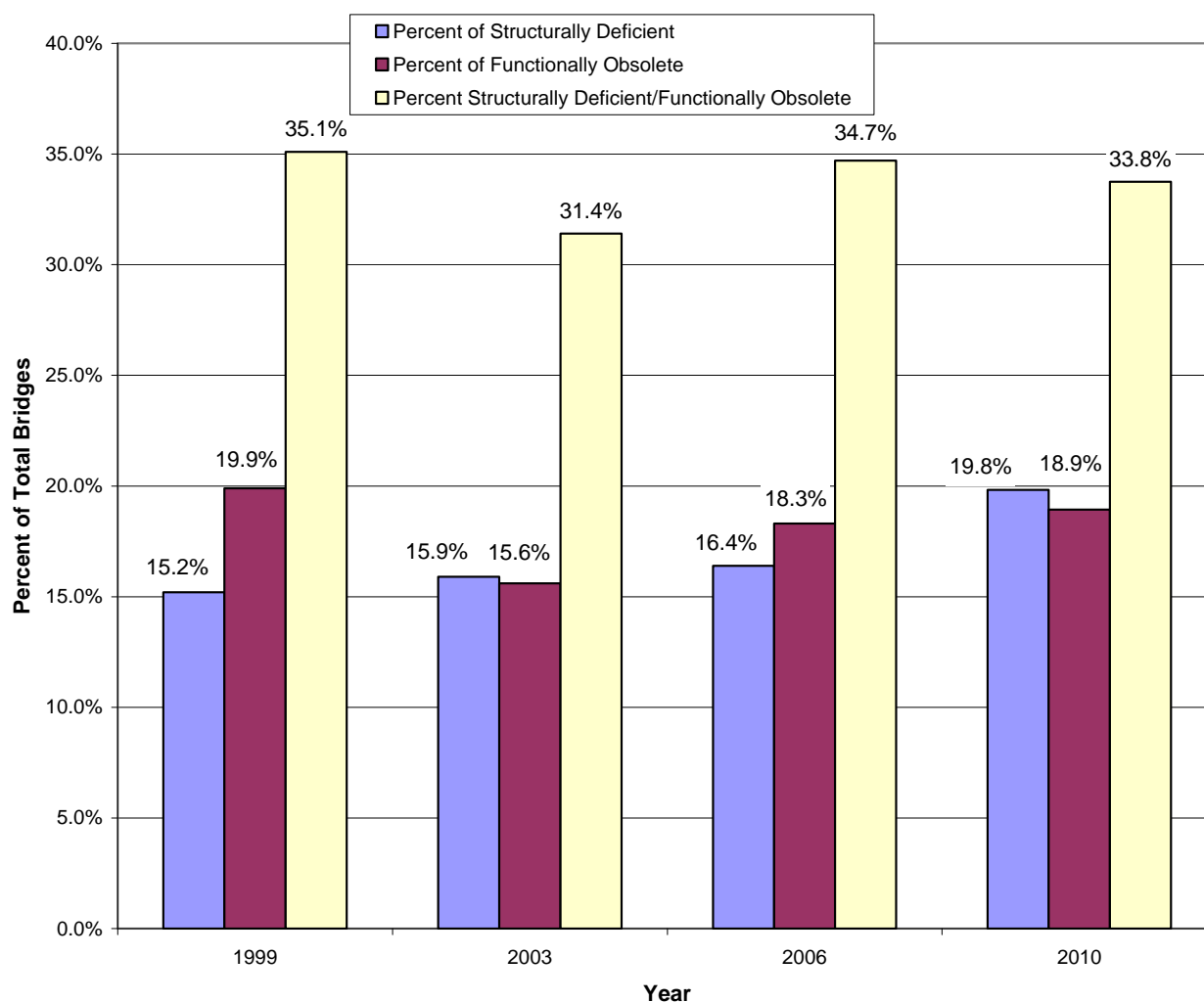


Historically, when compared to information from the Bridge Rating Tables for 1999, 2003 and 2006, the percentages for functionally obsolete and structurally deficient within the Montachusett Region have shown a slight decrease or have remained relatively constant. Structurally deficient bridges ranged from 15 to 16 percent of the Region's total, while functionally obsolete bridges accounted from 16 to 20 percent. Overall, these two categories comprised 31 to 35 percent of the total bridges in Montachusett. Specifically, between 2006 and 2010, there has been a decrease in FO and SD bridges of approximately 1% overall. This is a result of a decrease in SD bridges of 1.58% and a corresponding increase in FO bridges of 0.63%.

The following table and chart illustrate the percent of functionally obsolete and structurally deficient bridges within the Montachusett Region from 1999, 2003, 2006 and 2010.

Historical Bridge Ratings in MRPC Region

	1999	2003	2006	2010
Percent Structurally Deficient	15.20%	15.90%	16.40%	14.83%
Percent Functionally Obsolete	19.90%	15.60%	18.30%	18.93%
Percent Functionally Obsolete/Structurally Deficient	35.10%	31.40%	34.70%	33.75%





The following table provides a breakdown of the total bridge numbers by municipality as well as the number of structurally deficient and functionally obsolete bridges in each community from the 2010 Bridge Rating Table.

**2010 Bridges – Functionally Obsolete (FO) & Structurally Deficient (SD) by Community**

Community	Total	FO	% of Total	SD	% of Total	FO & SD	% of Total
Ashburnham	5	0	0.00%	0	0.00%	0	0.00%
Ashby	5	3	60.00%	1	20.00%	4	80.00%
Athol	22	3	13.64%	10	45.45%	13	59.09%
Ayer	4	1	25.00%	0	0.00%	1	25.00%
Clinton	6	0	0.00%	1	16.67%	1	16.67%
Fitchburg	41	9	21.95%	6	14.63%	15	36.59%
Gardner	32	3	9.38%	5	15.63%	8	25.00%
Groton	5	2	40.00%	0	0.00%	2	40.00%
Harvard	18	7	38.89%	1	5.56%	8	44.44%
Hubbardston	8	1	12.50%	2	25.00%	3	37.50%
Lancaster	15	5	33.33%	0	0.00%	5	33.33%
Leominster	34	4	11.76%	2	5.88%	6	17.65%
Lunenburg	5	1	20.00%	0	0.00%	1	20.00%
Petersham	4	1	25.00%	2	50.00%	3	75.00%
Phillipston	5	0	0.00%	1	20.00%	1	20.00%
Royalston	11	0	0.00%	3	27.27%	3	27.27%
Shirley	6	1	16.67%	0	0.00%	1	16.67%
Sterling	31	6	19.35%	1	3.23%	7	22.58%
Templeton	18	2	11.11%	1	5.56%	3	16.67%
Townsend	14	5	35.71%	1	7.14%	6	42.86%
Westminster	14	0	0.00%	6	42.86%	6	42.86%
Winchendon	14	6	42.86%	4	28.57%	10	71.43%
MRPC Region	317	60	18.93%	47	14.83%	107	33.75%



The following table provides a comparison between the 2006 and 2010 bridge data for each Montachusett community.

**2010 vs 2006 Bridges – Functionally Obsolete (FO) & Structurally Deficient (SD) by Community**

Community	Year	Total	FO	% of Total	SD	% of Total	FO & SD	% of Total
Ashburnham	2010	5	0	0.00%	0	0.00%	0	0.00%
	2006	5	0	0.00%	1	20.00%	1	20.00%
Ashby	2010	5	3	60.00%	1	20.00%	4	80.00%
	2006	5	2	40.00%	0	0.00%	2	40.00%
Athol	2010	22	3	13.64%	10	45.45%	13	59.09%
	2006	21	3	14.30%	6	28.60%	9	42.90%
Ayer	2010	4	1	25.00%	0	0.00%	1	25.00%
	2006	4	1	25.00%	0	0.00%	1	25.00%
Clinton	2010	6	0	0.00%	1	16.67%	1	16.67%
	2006	6	0	0.00%	2	33.30%	2	33.30%
Fitchburg	2010	41	9	21.95%	6	14.63%	15	36.59%
	2006	41	7	17.10%	5	12.20%	12	29.30%
Gardner	2010	32	3	9.38%	5	15.63%	8	25.00%
	2006	32	5	15.60%	4	12.50%	9	28.10%
Groton	2010	5	2	40.00%	0	0.00%	2	40.00%
	2006	5	1	20.00%	0	0.00%	1	20.00%
Harvard	2010	18	7	38.89%	1	5.56%	8	44.44%
	2006	18	6	33.30%	2	11.10%	8	44.40%
Hubbardston	2010	8	1	12.50%	2	25.00%	3	37.50%
	2006	8	1	12.50%	1	12.50%	2	25.00%
Lancaster	2010	15	5	33.33%	0	0.00%	5	33.33%
	2006	15	5	33.30%	1	6.70%	6	40.00%
Leominster	2010	34	4	11.76%	2	5.88%	6	17.65%
	2006	35	3	8.60%	4	11.40%	7	20.00%
Lunenburg	2010	5	1	20.00%	0	0.00%	1	20.00%
	2006	5	1	20.00%	1	20.00%	2	40.00%
Petersham	2010	4	1	25.00%	2	50.00%	3	75.00%
	2006	4	1	25.00%	2	50.00%	3	75.00%
Phillipston	2010	5	0	0.00%	1	20.00%	1	20.00%
	2006	5	0	0.00%	1	20.00%	1	20.00%
Royalston	2010	11	0	0.00%	3	27.27%	3	27.27%
	2006	11	0	0.00%	4	36.40%	4	36.40%
Shirley	2010	6	1	16.67%	0	0.00%	1	16.67%
	2006	6	1	16.70%	0	0.00%	1	16.70%
Sterling	2010	31	6	19.35%	1	3.23%	7	22.58%
	2006	31	7	22.60%	4	12.90%	11	35.50%
Templeton	2010	18	2	11.11%	1	5.56%	3	16.67%
	2006	18	2	11.10%	2	11.10%	4	22.20%
Townsend	2010	14	5	35.71%	1	7.14%	6	42.86%
	2006	14	4	28.60%	2	14.30%	6	42.90%
Westminster	2010	14	0	0.00%	6	42.86%	6	42.86%
	2006	15	1	6.70%	7	46.70%	8	53.30%
Winchendon	2010	14	6	42.86%	4	28.57%	10	71.43%
	2006	13	7	53.80%	3	23.10%	10	76.90%
<b>MRPC Region</b>	<b>2010</b>	<b>317</b>	<b>60</b>	<b>18.93%</b>	<b>47</b>	<b>14.83%</b>	<b>107</b>	<b>33.75%</b>
	<b>2006</b>	<b>317</b>	<b>58</b>	<b>18.30%</b>	<b>52</b>	<b>16.40%</b>	<b>110</b>	<b>34.70%</b>
	<b>Change</b>	<b>0</b>	<b>-2</b>	<b>-0.63%</b>	<b>5</b>	<b>1.58%</b>	<b>3</b>	<b>0.95%</b>



On a community by community basis, six (6) municipalities had an increase in the number of FO bridges from 2006; Ashby, Fitchburg, Groton, Harvard, Leominster and Townsend. Six communities saw an increase in SD bridges; Ashby, Athol, Fitchburg, Gardner, Hubbardston and Winchendon. The Region as a whole saw the number of FO bridges increase by 2 while the SD bridges decrease by 5. Overall, the number of FO and SD bridges dropped by 3. Please note that the total number of bridges for the Region remained constant at 317, four (4) individual communities, Athol, Leominster, Westminster and Winchendon, had changes to their bridge totals of plus/minus 1. This is likely due to corrections and improvements to the state inventory program.

### **Structurally Deficient Bridges**

Of the 47 structurally deficient bridges, 6 are currently listed on the Montachusett MPO FFY 2011 – 2014 Transportation Improvement Program (TIP). These six have an estimated construction cost of \$17,820,205.

**Structurally Deficient Bridges – FFY 2011-2014 Montachusett TIP**

ID	Location	Project Description	Funding Category	Total Estimated Cost	Federal Funds	Non-Federal Match	FFY
603747	Gardner	Bridge Replacement, G-01-017, Winter Street over Baker Brook	BR	\$841,880	\$673,504	\$168,376	2011
604336	Gardner	Bridge Replacement, G-01-022, Mill Street over Baker Brook	BR	\$1,163,705	\$930,964	\$232,741	2011
604366	Templeton	Bridge Replacement, T-02-019, North Main Street over East Templeton Pond Outlet	BR	\$1,735,550	\$1,388,440	\$347,110	2011
605104	Leominster	Bridge Reconstruction, L-08-024, Route 12 Over Route 2 (EB & WB)	BR	\$10,657,500	\$8,526,000	\$2,131,500	2012
603514	Leominster	Bridge Replacement, L-08-014, Whitney Street Over the Monoosnoc Brook	BR	\$1,861,050	\$1,488,840	\$372,210	2013
604175	Royalston	Bridge Replacement, R-12-004, Northeast Fitzwilliam Road Over the Lawrence Brook	BR	\$1,560,520	\$1,248,416	\$312,104	2013
<b>TOTAL</b>				<b>\$17,820,205</b>	<b>\$14,256,164</b>	<b>\$3,564,041</b>	



Additionally, ten (10) other bridges are currently under construction, planned to be under construction or have recently completed construction in the Region. These projects have a total estimated cost of \$36,800,047. Please note that the Route 2 East and West Bound bridge in Westminster is listed as two separate bridges in the 2010 Bridge Inventory, hence the notation of 9 bridges in the discussion above while only 9 bridges appear in the table below.

#### Structurally Deficient Bridges Under Design/Construction/Completed

ID	Location	Project Description	Funding Category	Total Estimated Cost	Federal Funds	Non-Federal Match	FFY
601089	Athol	<b>Rt 2A (Main St) Bridge Replacement</b> - Bridge # A-15-006 over Millers River	BR	\$6,250,000	\$5,000,000	\$1,250,000	2007
603582	Athol/Orange	<b>Route 2</b> – Replacement of Bridge #A-15-030=O-03-020 over Lake Rohunta	NFA	\$1,350,000	\$0	\$1,350,000	2007
603492	Clinton	<b>Water Street</b> – Reconstruction of Bridge # C-16-002 over the Nashua River	BR	\$1,925,000	\$1,540,000	\$385,000	2009
604162	Gardner	<b>Gardner</b> - Bridge Superstructure Replacements, G-01-035 & G-01-036, Route 2 over Route 68	BR	\$8,906,708	\$7,125,366	\$1,781,342	2008
604264	Sterling	<b>Sterling</b> - Bridge Replacement, S-25-006, Route 62 (Princeton Road) over the Stillwater River	NFA	\$1,386,086	\$0	\$1,386,086	2010
604045	Westminster	<b>Depot Road</b> – Replacement of Bridge #W-28-019 over Round Meadow Brook	BR	\$661,000	\$528,800	\$132,200	2008
603700	Westminster	<b>Route 12 (Ashburnham State Rd)</b> – Replacement of Bridge #W-28-007 over Nashua River	NFA	\$1,150,000	\$0	\$1,150,000	2007
603321	Westminster	<b>Route 2 East &amp; West Bound</b> – Replacement of Bridge # W-28-021 over West Main Street	BR	\$13,671,253	\$0	\$13,671,253	2008
602587	Westminster	<b>Route 12 (Ashburnham State Rd)</b> – Reconstruction of Bridge #W-28-017 over Phillips Brook	BR	\$1,500,000	\$0	\$1,500,000	2008
<b>TOTAL</b>				<b>\$36,800,047</b>	<b>\$14,194,166</b>	<b>\$22,605,881</b>	

One bridge (below) was recently completed in Leominster but is not currently listed in the 2010 Bridge Inventory list.

ID	Location	Project Description	Funding Category	Total Estimated Cost	Federal Funds	Non-Federal Match	FFY
600760	Leominster	<b>Mechanic Street Bridge</b> – Replacement of Bridge # L-08-003 over North Nashua River	BR	\$2,400,000	\$0	\$2,400,000	2008
<b>TOTAL</b>				<b>\$2,400,000</b>	<b>\$0</b>	<b>\$2,400,000</b>	

#### Priorities – Structurally Deficient Bridges

From the above analysis, 16 of the 47 identified structurally deficient bridges (or 34%) in the Region are scheduled for improvement. The remaining 31 structurally deficient bridges still need to be addressed.





### **Functionally Obsolete Bridges**

As mentioned, functionally obsolete bridges are defined as “a bridge which has no structural deficiencies but does not meet standards to adequately serve current user demands.” These bridges do not necessarily represent a bridge in need of major repair or reconstruction. Within the Montachusett Region, some 60 bridges were identified as such.

### **Priorities – Functionally Obsolete Bridges**

Currently, all 60 identified functionally obsolete bridges in the Region need to be addressed in some manner.

### **Project Needs/Recommendations**

Based upon the bridge projects listed within the FFY2011-2014 Montachusett TIP, an estimated construction cost can be determined in order to assess future funding needs for the remaining structurally deficient and functionally obsolete bridges in the Region. Total TIP bridge project costs as listed in the above table are \$17,820,205 for 6 projects. The estimated average cost per project was therefore calculated as \$2,970,034. The average cost derived from the 10 bridge projects currently under construction is \$3,680,005 (\$36,800,047 total divided by 10 bridges). Removing the highest and lowest costs from this total (i.e. \$13,671,253 and \$661,000) results in a new total cost of \$22,467,794. Divided by 8 bridges this results in an average cost of \$2,808,474. Therefore, looking at the TIP average of \$2,970,034 and the construction average of \$2,808,474 the results are comparable and an average of the two figures results in a cost of \$2,889,254. For computational purposes, this is rounded to \$2,890,000. Based upon MassDOT input related to estimated costs, FO bridge costs are assumed to be approximately 60 percent of the cost to repair a SD bridge, therefore for computational purposes, a figure of \$1,734,000 will be utilized for FO bridge repair estimates. The remaining SD bridges in need of repair and all the FO bridges are listed in the table below.

Future funding needs for the remaining FO and SD bridges in the Region are estimated as follows:

Total Structurally Deficient Bridges in the Region	47
Identified Bridges on FFY2011-2014 TIP	6
Bridges Advertised/Under Construction/Completed	10
Remaining Structurally Deficient Bridges in Need of Repair	31
Estimated Avg. Cost/Bridge Project	\$2,890,000
<b>Estimated Funds Needed for Structurally Deficient Bridges</b>	<b>\$89,590,000</b>
 Total Functionally Obsolete Bridges in the Region	 60
Identified Bridges on FFY2011-2014 TIP	0
Remaining Functionally Obsolete Bridges in Need of Repair	60
Estimated Avg. Cost/Bridge Project	\$1,734,000
<b>Estimated Funds Needed for Functionally Obsolete Bridges</b>	<b>\$104,040,000</b>
 <b>TOTAL ESTIMATED FUNDS NEEDED</b>	 <b>\$193,630,000</b>



Bridge Rating Deficiency: STRUCTURALLY DEFICIENT BRIDGES									
City/Town	Bridge No.	Over	Under	Owner	Functional Class	Year Built	Year Rebuilt	AASHTO Rating	Deficiency
Ashby	A12006	TURNPIKE RD	WATER WILLARD BROOK	Town Agency	Minor Collector	1940	1993	50.5	SD
Athol	A15005	WASHINGTON AVE	WATER S ATHOL PND OUTLET	Town Agency	Rural Local	1940		49.4	SD
Athol	A15007	HWY EXCHANGE ST	WATER MILLERS RIVER	Town Agency	Urban Minor Arterial	1939	1988	50.5	SD
Athol	A15008	HWY CRESCENT ST	WATER MILLERS RIVER	Town Agency	Urban Minor Arterial	1937		5.0	SD
Athol	A15009	ST 32 CHESNT HL AV	WATER MILLERS RIVER	Town Agency	Urban Minor Arterial	1850	1921	6.2	SD
Athol	A15016	PINEDALE AVE	WATER E BR TULLY RIVER	Town Agency	Urban Collector	1937		40.9	SD
Athol	A15018	ST 2 A/S MAIN ST	WATER WEST BROOK	State Highway Agency	Urban Arterial	1930		68.6	SD
Athol	A15033	ST 2	HWY WHITE POND RD	State Highway Agency	Freeway/Expressway	1954		64.4	SD
Athol	A15034	ST 2	HWY S ATHOL RD	State Highway Agency	Freeway/Expressway	1954		63.6	SD
Fitchburg	F04002	ST 2	WATER WYMAN BROOK	State Highway Agency	Freeway/Expressway	1947		62.6	SD
Fitchburg	F04007	ST 2 A/ST12/KIMBL	WATER N NASHUA RIVER	State Highway Agency	Urban Minor Arterial	1930		65.2	SD
Fitchburg	F04008	ST 31 RIVER ST	WATER N NASHUA RIVER	State Highway Agency	Urban Arterial	1947		18.4	SD
Fitchburg	F04010	ST 31 RIVER ST	WATER N NASHUA RIVER	State Highway Agency	Urban Arterial	1900	1952	73.1	SD
Fitchburg	F04014	HWY PUTNAM ST	WATER N NASHUA RIVER	City/Municipal Highway	Urban Minor Arterial	1900		50.1	SD
Fitchburg	F04053	HWY ASHBY W RD	WATER SCOTT RESRVR OTLT	City/Municipal Highway	Urban Local	1900	1959	29.7	SD
Gardner	G01008	HWY PLEASANT ST	RR BMRR	State Highway Agency	Urban Collector	1885	1954	42.7	SD
Gardner	G01023	HWY TRAVERS ST	WATER TRAVERS POND OTLT	City/Municipal Highway	Urban Local	1938		38.8	SD
Harvard	H09011	ST 110/ST 111/AYER	ST 2	State Highway Agency	Rural Minor Arterial	1950		62.3	SD
Hubbardston	H24004	BURNSHIRT RD	WATER BURNSHIRT RIVER	Town Agency	Major Collector	1940		62.5	SD
Hubbardston	H24021	ST 62 OLD BSTN TPK	WATER W BR WARE RIVER	Town Agency	Major Collector	1950		52.7	SD
Petersham	P08001	ST 32 /ST122/BARRE	WATER E BR SWIFT RIVER	State Highway Agency	Rural Minor Arterial	1937	1940	38.1	SD
Petersham	P08002	HWY GLN VALLY RD	WATER E BR SWIFT RIVER	Town Agency	Rural Local	1940	1976	18.9	SD
Phillipston	P09004	US202 /ST2	ST 2 A/STATE RD	State Highway Agency	Rural Arterial	1959		67.2	SD
Royalston	R12001	HWY STOCKWELL RD	WATER LAWRENCE BROOK	Town Agency	Rural Local	1939	1985	18.5	SD
Royalston	R12006	HWY N FITZWLM RD	WATER LAWRENCE BROOK	Town Agency	Minor Collector	1959		51.6	SD
Townsend	T07008	HWY WHEELER RD	WATER WILLARD BROOK	Town Agency	Urban Collector	1900	1973	14.8	SD
Westminster	W28010	WHITMANVILLE RD	WATER WHITMAN RIVER	Town Agency	Rural Local	1937		39.2	SD
Winchendon	W39001	HWY HARRIS RD	WATER TARBELL BROOK	Town Agency	Rural Local	1940		49.0	SD
Winchendon	W39007	US202 RIVER ST	WATER MILLERS RIVER	State Highway Agency	Urban Minor Arterial	1932		49.6	SD
Winchendon	W39013	HWY HIGH ST	WATER MILLERS RIVER	Town Agency	Urban Collector	1850	1973	47.7	SD
Winchendon	W39015	HWY N ROYLSTN RD	WATER W BR MILLERS RIVER	Town Agency	Rural Local	1850	1980	41.8	SD



Bridge Rating Deficiency: FUNCTIONALLY OBSOLETE BRIDGES									
City/Town	Bridge No.	Over	Under	Owner	Functional Class	Year Built	Year Rebuilt	AASHTO Rating	Deficiency
Ashby	A12010	HWY HOSMER RD	WATER WILLARD BROOK	State Park	Rural Local	1935		68.3	FO
Ashby	A12011	ST 31 GREENVILLE RD	WATER TRAPFALL BROOK	State Highway Agency	Major Collector	1981		79.2	FO
Ashby	A12015	HWY RINDGE RD	WATER FALULAH BROOK	Town Agency	Minor Collector	1997		79.9	FO
Athol	A15004	HWY MORGAN AVE	WATER S ATHOL PND OTLET	Town Agency	Rural Local	1979		79.9	FO
Athol	A15012	ST 32 CHSTNT HILL	RR BMRR	State Highway Agency	Urban Minor Arterial	1995		69.8	FO
Athol	A15013	ST 2 A/MAIN ST	RR BMRR	State Highway Agency	Urban Arterial	1938		54.9	FO
Ayer	A19003	ST 2 A/E MAIN ST	RR MBTA/BMRR	State Highway Agency	Urban Arterial	1949		72.7	FO
Fitchburg	F04001	ST 31 PRINCETON RD	WATER WHITMANS RIVER	State Highway Agency	Urban Minor Arterial	1929		75.9	FO
Fitchburg	F04011	HWY CIRCLE ST	WATER N NASHUA RIVER	City/Municipal Highway	Urban Local	1937		66.3	FO
Fitchburg	F04012	ST 31 NB RLLSTNE ST	WATER N NASHUA RIVER	State Highway Agency	Urban Minor Arterial	1909	1997	60.0	FO
Fitchburg	F04012	ST 31 NB RLLSTNE ST	HWY BROAD ST	State Highway Agency	Urban Minor Arterial	1997		74.5	FO
Fitchburg	F04023	ST 31 ASHBY RD	WATER FALLULAH BROOK	State Highway Agency	Urban Arterial	1904	1934	48.1	FO
Fitchburg	F04024	HWY FISHER RD	WATER FALLULAH BROOK	City/Municipal Highway	Urban Local	1909		77.9	FO
Fitchburg	F04033	HWY AIRPORT RD	WATER N NASHUA RIVER	City/Municipal Highway	Urban Minor Arterial	1910	1962	51.3	FO
Fitchburg	F04034	HWY SANBORN ST	WATER PHILLIPS BROOK	City/Municipal Highway	Urban Local	1931		38.9	FO
Fitchburg	F04039	HWY PUTNAM ST	RR BMRR	State Highway Agency	Urban Minor Arterial	1899	1988	72.5	FO
Gardner	G01010	HWY CROSS ST	RR BMRR SPUR	State Highway Agency	Urban Collector	1874	1981	67.3	FO
Gardner	G01012	HWY UNION ST	RR PWRR	State Highway Agency	Urban Collector	1908	1986	77.2	FO
Gardner	G01034	ST 2 WB	RR BMRR	State Highway Agency	Freeway/Expressway	1961		58.2	FO
Groton	G14003	ST225 W MAIN ST	WATER NASHUA RIVER	State Highway Agency	Urban Minor Arterial	1930		64.2	FO
Groton	G14005	ST 119 SOUTH RD	WATER NASHUA RIVER	State Highway Agency	Rural Minor Arterial	1931	2000	66.7	FO
Harvard	H09004	ST110 /ST111/AYER	WATER BOWERS BROOK	State Highway Agency	Rural Local	1925		58.3	FO
Harvard	H09013	HWY LITTLETON RD	ST 2	State Highway Agency	Minor Collector	1950	1990	75.1	FO
Harvard	H09016	ST 2	HWY CAMP RD	State Highway Agency	Rural Arterial	1951		70.8	FO
Harvard	H09017	ST 2	RR BMRR	State Highway Agency	Freeway/Expressway	1951		58.6	FO
Harvard	H09018	ST 2	HWY DEPOT ST	State Highway Agency	Freeway/Expressway	1951		74.2	FO
Harvard	H09019	HWY JACKSON RD	WATER NASHUA RIVER	State Highway Agency	Urban Local	1951	1983	68.7	FO
Harvard	H09020	I 495 NB	HWY STOW RD	State Highway Agency	Urban Interstate	1963		74.7	FO
Hubbardston	H24009	HWY EVERGREEN RD	WATER MASON BROOK	Town Agency	Rural Local	1920	1938	56.4	FO
Lancaster	L02002	ST117 SEVEN BRG RD	WATER NASHUA RIVER	State Highway Agency	Urban Arterial	1927		74.6	FO
Lancaster	L02005	HWY MILL ST	WATER NASHUA RIVER	Town Agency	Urban Collector	1996		79.1	FO
Lancaster	L02015	HWY LUNENBURG RD	ST 2	State Highway Agency	Major Collector	1951		73.6	FO



Bridge Rating Deficiency: FUNCTIONALLY OBSOLETE BRIDGES (cont.)									
City/Town	Bridge No.	Over	Under	Owner	Functional Class	Year Built	Year Rebuilt	AASHTO Rating	Deficiency
Lancaster	L02018	HWY JACKSON RD	ST 2	State Highway Agency	Urban Local	1951		49.8	FO
Lancaster	L02024	I 190	WATER WEKEPEKE BROOK	State Highway Agency	Urban Interstate	1978		66.0	FO
Leominster	L08001	HWY HAMILTON ST	WATER N NASHUA RIVER	City/Municipal Highway	Urban Minor Arterial	1955		67.3	FO
Leominster	L08006	HWY ADAMS ST	WATER MONOOSSENOCK BRK	City/Municipal Highway	Urban Local	1904		69.3	FO
Leominster	L08028	HWY HAMILTON ST	ST 2	State Highway Agency	Urban Minor Arterial	1949		74.5	FO
Leominster	L08030	ST 13 MAIN ST	ST 2	State Highway Agency	Urban Arterial	1949		74.9	FO
Lunenburg	L17008	HWY TOWNSND HR	WATER Mulpus Brook	Town Agency	Urban Minor Arterial	1937	1994	78.8	FO
Petersham	P08005	HWY QUAKER RD	WATER E BR SWIFT RIVER	Town Agency	Rural Local	1938	1944	73.6	FO
Shirley	S13017	HWY LOVELL RD	WATR CATAUNEMAUG BRK	Other State Agencies	Urban Local	1950		63.6	FO
Sterling	S25022	I 190 SB	ST140 REDEMPTION ROCK TR	State Highway Agency	Urban Interstate	1979		73.2	FO
Sterling	S25022	I 190 NB	ST140 REDEMPTION ROCK TR	State Highway Agency	Urban Interstate	1979		73.2	FO
Sterling	S25028	I 190 SB	HWY ROWLEY HILL RD	State Highway Agency	Urban Interstate	1980		72.9	FO
Sterling	S25030	I 190 SB & RAMP C	RR CSX	State Highway Agency	Freeway/Expressway	1978		70.6	FO
Sterling	S25033	I 190	HWY AGRICLTRL UNDRPS	State Highway Agency	Rural Interstate	1979		76.1	FO
Sterling	S25034	I 190	HWY AGRICLTRL UNDRPS	State Highway Agency	Urban Interstate	1979		75.4	FO
Templeton	T02005	HWY HMLET MLL RD	WATER OTTER RIVER	Town Agency	Urban Local	1938		63.6	FO
Templeton	T02022	ST 2 EB	ST 2 A/PATRIOTS RD	State Highway Agency	Rural Arterial	1969		69.0	FO
Townsend	T07004	ST119 MAIN ST	WATER SQUANNACOOK RIV	State Highway Agency	Urban Minor Arterial	1950		22.0	FO
Townsend	T07006	HWY CANAL ST	WATER SQUANNACOOK RIV	Town Agency	Urban Collector	1850	1976	65.4	FO
Townsend	T07007	ST119 MAIN ST	WATER PEARL HILL BROOK	State Highway Agency	Urban Minor Arterial	1907	1931	72.4	FO
Townsend	T07010	ST119 RIVER RD	WATER WILLARD BROOK	State Highway Agency	Major Collector	1908	1931	77.2	FO
Townsend	T07016	ST119 RIVER RD	WATER WILLARD BROOK	State Highway Agency	Major Collector	1908	1931	63.7	FO
Winchendon	W39002	US202 MAPLE ST	WATER N BR MILLERS RIVER	State Highway Agency	Urban Minor Arterial	1937		55.4	FO
Winchendon	W39004	HWY GLENALLAN ST	WATER MILLERS RIVER	Town Agency	Urban Collector	1939		74.0	FO
Winchendon	W39006	HWY BROWN ST	WATER MILLERS RIVER	Town Agency	Urban Local	1964		63.5	FO
Winchendon	W39012	ST 12 SPRING ST	WATER MILLERS RIVER	State Highway Agency	Urban Arterial	1927		75.5	FO
Winchendon	W39030	HWY CAMPGRND RD	WATER BEAMAN BROOK	State Highway Agency	Rural Local	1970		34.3	FO
Winchendon	W39036	HWY MONOM DR WST	WATER N BR MILLERS RIVER	Town Agency	Urban Local	1977		78.7	FO

## Pavement

Of the approximately 2,085 miles of roads in the Montachusett region, approximately 560 miles are Surface Transportation Program (STP) eligible roadways and 83 miles are National Highway System (NHS) eligible roadways. This represents 31% of the regions road miles. The remaining 1,441 miles (69%) are state and local aid eligible roads.

They are defined as follows:

National Highway System (NHS) – all interstate roadways and a systematic network of principal arterials spanning the state. In addition, roads connecting the NHS roadways to military bases (known as the Strategic Highway Network) are also considered part of the NHS network. NHS passenger and freight terminals are connected by roadways called NHS connectors.

Surface Transportation Program (STP) – comprised of any functionally classified roadway not part of the NHS network. STP funded roadways include all urban arterials, urban collectors and rural arterials. According to previous funding legislation, rural collectors are STP eligible, but have a limitation on the STP funding amount.

State and Local Aid – includes Chapter 90 and other non-Federal Aid categories. Roadways that fall under this category are comprised of roads functionally classified as local roads.

Community	NHS* Miles	STP* Miles	Total Fed Aid Miles	State & Local Aid Miles	Total Miles
Ashburnham	0.00	18.15	18.15	79.69	97.84
Ashby	0.00	11.63	11.63	53.09	64.72
Athol	5.11	27.27	32.38	78.92	111.30
Ayer	2.93	13.79	16.72	32.34	49.06
Clinton	0.00	17.60	17.60	34.03	51.63
Fitchburg	10.80	54.60	65.40	134.51	199.91
Gardner	9.00	32.62	41.62	73.30	114.92
Groton	0.00	33.81	33.81	77.18	110.99
Harvard	8.82	7.94	16.76	60.59	77.35
Hubbardston	0.00	21.52	21.52	63.13	84.65
Lancaster	6.17	24.61	30.78	38.96	69.74
Leominster	7.41	54.16	61.57	115.43	177.00
Lunenburg	0.00	33.38	33.38	61.89	95.27
Petersham	0.00	19.52	19.52	59.53	79.05
Phillipston	2.97	8.42	11.39	40.60	51.99
Royalston	0.00	20.90	20.90	51.22	72.12
Shirley	0.00	19.89	19.89	28.94	48.83
Sterling	6.65	34.16	40.81	66.00	106.81
Templeton	5.66	34.85	40.51	61.07	101.58
Townsend	0.00	23.44	23.44	72.08	95.52
Westminster	8.60	29.24	37.84	71.51	109.35
Winchendon	9.31	18.90	28.21	86.90	115.11
<b>Totals</b>	<b>83.43</b>	<b>560.40</b>	<b>643.83</b>	<b>1,440.91</b>	<b>2,084.74</b>
<b>Percent of Total</b>	<b>4.00%</b>	<b>26.88%</b>		<b>69.12%</b>	

\*Source: MassDOT Road Inventory File

As stated above, rural collectors are STP eligible but have a funding limitation. The table above provides a breakdown of roads by community by their aid eligibility, NHS, STP or State Aid/Local. The State Aid/Local figures include those rural collector miles that may also be STP eligible.

## Chapter 5 – Infrastructure

The structural conditions of the majority of the Federal Aid eligible roads are determined by MassDOT and MRPC pavement surveys. The condition is expressed by assigning a Pavement Serviceability Index (PSI) number from 0 to 5 to segments along the roadway. PSI is an overall rating of the pavements condition. Conditions are rated as Excellent, Good, Fair and Poor.

The following table shows a general correlation between PSI, condition, repair strategies and associated cost. The estimated repair cost was derived from conversations with a Pavement Management Users Group (PMUG) comprised of other Regional Planning Agencies, Massachusetts Department of Transportation (MassDOT) and the Federal Highway Administration (FHWA) and reflect the estimated cost to bring the pavement condition to “excellent.”

PSI	Condition	Associated Repair	Repair Cost Per Sq. Yard
0 - 2.29	Poor	Reconstruction	\$45
2.3 - 2.79	Fair	Rehabilitation (Mill/Overlay)	\$18
2.8 - 3.49	Good	Preventative Maintenance	\$8.50
3.5 - 5	Excellent	Routine Maintenance	\$0.75

Utilizing this information a general condition of the Montachusett Region's Federal Aid eligible roadway network can be developed. The following lists pavement condition on federal aid eligible roads by town in the region. Shown is a sample of the total Federal Aid Eligible network which was surveyed by MassDOT. The table following the town breakdowns, “Pavement Maintenance Needs on the Montachusett Region’s Federal Aid Eligible Roads”, lists a total weighted average for repairs needed on all federal aid eligible roads in the region. These federal aid miles are further broken down by Local and State Jurisdiction. Please note that due to the time frame between data collection and report preparation, conditions of the roadways may change. Therefore, this information should be viewed in general terms regarding needs and condition.

### Pavement Needs in the Montachusett Region – From Surveys (continued below)

Local Jurisdiction Surveyed					State Jurisdiction Surveyed			
Ashburnham	Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost	
	Excellent	Routine Maintenance	–	–	–	–	–	
	Good	Preventative Maintenance	3.41	144086	\$ 1,224,731.00	2.48	107573	\$ 914,370.50
	Fair	Rehabilitation	2.89	121956	\$ 2,195,208.00	3.37	153716	\$ 2,766,888.00
	Poor	Reconstruction	1.6	71576	\$ 3,220,920.00	2.7	114746	\$ 5,163,570.00
	Total		7.9		\$ 6,640,859.00	8.55		\$ 8,844,828.50



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		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Ashby	Excellent	Routine Maintenance	–	–	–	0.02	634	\$ 475.50
	Good	Preventative Maintenance	–	–	–	6.68	354590	\$ 3,014,015.00
	Fair	Rehabilitation	–	–	–	2.84	121480	\$ 2,186,640.00
	Poor	Reconstruction	–	–	–	2.14	109571	\$ 4,930,695.00
	Total		0		\$ -	11.68		\$ 10,131,350.00
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Athol	Excellent	Routine Maintenance	0.26	19646	\$ 14,734.50	6.41	282959	\$ 212,219.25
	Good	Preventative Maintenance	1.91	112318	\$ 954,703.00	3.1	137976	\$ 1,172,796.00
	Fair	Rehabilitation	2.77	154211	\$ 2,775,798.00	2.54	98548	\$ 1,773,864.00
	Poor	Reconstruction	1.55	74500	\$ 3,352,500.00	0.85	42198	\$ 1,898,910.00
	Total		6.49		\$ 7,097,735.50	12.9		\$ 5,057,789.25
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Ayer	Excellent	Routine Maintenance	0.14	5543	\$ 4,157.25	0.98	46511	\$ 34,883.25
	Good	Preventative Maintenance	0.09	2613	\$ 22,210.50	1.97	95745	\$ 813,832.50
	Fair	Rehabilitation	1.43	79111	\$ 1,423,998.00	0.8	44022	\$ 792,396.00
	Poor	Reconstruction	0.7	40712	\$ 1,832,040.00	0.28	14714	\$ 662,130.00
	Total		2.36		\$ 3,282,405.75	4.03		\$ 2,303,241.75
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Clinton	Excellent	Routine Maintenance	0.17	9346	\$ 7,009.50	–	–	–
	Good	Preventative Maintenance	1.02	51050	\$ 433,925.00	0.3	20637	\$ 175,414.50
	Fair	Rehabilitation	3.1	168071	\$ 3,025,278.00	0.7	35988	\$ 647,784.00
	Poor	Reconstruction	2.72	164390	\$ 7,397,550.00	0.55	29146	\$ 1,311,570.00
	Total		7.01		\$ 10,863,762.50	1.55		\$ 2,134,768.50
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Fitchburg	Excellent	Routine Maintenance	1.1	54326	\$ 40,744.50	2.52	107905	\$ 80,928.75
	Good	Preventative Maintenance	8.7	486372	\$ 4,134,162.00	7.06	352303	\$ 2,994,575.50
	Fair	Rehabilitation	6.04	360406	\$ 6,487,308.00	2	105134	\$ 1,892,412.00
	Poor	Reconstruction	4.66	298815	\$ 13,446,675.00	1.31	66449	\$ 2,990,205.00
	Total		20.5		\$ 24,108,889.50	12.89		\$ 7,958,121.25

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					Miles	Square Yards	Repair Cost	
Gardner	Excellent	Routine Maintenance	3.88	259778	\$ 194,833.50	4.68	226729	\$ 170,046.75
	Good	Preventative Maintenance	2.26	158001	\$ 1,343,008.50	6.35	339167	\$ 2,882,919.50
	Fair	Rehabilitation	4.38	304017	\$ 5,472,306.00	4.22	261499	\$ 4,706,982.00
	Poor	Reconstruction	0.51	33587	\$ 1,511,415.00	1.34	82943	\$ 3,732,435.00
	Total		11.03		\$ 8,521,563.00	16.59		\$ 11,492,383.25
					Miles	Square Yards	Repair Cost	
Groton	Excellent	Routine Maintenance	1.69	76200	\$ 57,150.00	0.3	13362	\$ 10,021.50
	Good	Preventative Maintenance	3.36	164925	\$ 1,401,862.50	3.7	162295	\$ 1,379,507.50
	Fair	Rehabilitation	4.54	201030	\$ 3,618,540.00	0.61	25973	\$ 467,514.00
	Poor	Reconstruction	1.64	67725	\$ 3,047,625.00	0.82	37060	\$ 1,667,700.00
	Total		11.23		\$ 8,125,177.50	5.43		\$ 3,524,743.00
					Miles	Square Yards	Repair Cost	
Harvard	Excellent	Routine Maintenance	0.22	10373	\$ 7,779.75	12.44	588420	\$ 441,315.00
	Good	Preventative Maintenance	2.28	106299	\$ 903,541.50	1.72	70904	\$ 602,684.00
	Fair	Rehabilitation	3.87	166401	\$ 2,995,218.00	2.22	84668	\$ 1,524,024.00
	Poor	Reconstruction	0.3	11944	\$ 537,480.00	—	—	—
	Total		6.67		\$ 4,444,019.25	16.38		\$ 2,568,023.00
					Miles	Square Yards	Repair Cost	
Hubbardston	Excellent	Routine Maintenance	3.12	120133	\$ 90,099.75	—	—	—
	Good	Preventative Maintenance	2.54	98484	\$ 837,114.00	—	—	—
	Fair	Rehabilitation	8.27	439638	\$ 7,913,484.00	—	—	—
	Poor	Reconstruction	0.11	7482	\$ 336,690.00	0.01	760	\$ 34,200.00
	Total		14.04		\$ 9,177,387.75	0.01		\$ 34,200.00
					Miles	Square Yards	Repair Cost	
Lancaster	Excellent	Routine Maintenance	0.31	12715	\$ 9,536.25	5.54	234153	\$ 175,614.75
	Good	Preventative Maintenance	6.89	332500	\$ 2,826,250.00	1.45	61392	\$ 521,832.00
	Fair	Rehabilitation	7.33	334899	\$ 6,028,182.00	4.68	197687	\$ 3,558,366.00
	Poor	Reconstruction	0.81	37679	\$ 1,695,555.00	3.43	144693	\$ 6,511,185.00
	Total		15.34		\$ 10,559,523.25	15.1		\$ 10,766,997.75



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		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Leominster	Excellent	Routine Maintenance	3.31	188383	\$ 141,287.25	6.01	253744	\$ 190,308.00
	Good	Preventative Maintenance	3.22	171835	\$ 1,460,597.50	6.94	298033	\$ 2,533,280.50
	Fair	Rehabilitation	4.22	246091	\$ 4,429,638.00	2.24	118471	\$ 2,132,478.00
	Poor	Reconstruction	3.64	230014	\$ 10,350,630.00	1.05	59430	\$ 2,674,350.00
	Total		14.39		\$ 16,382,152.75	16.24		\$ 7,530,416.50
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Lunenburg	Excellent	Routine Maintenance	0.47	23919	\$ 17,939.25	–	–	–
	Good	Preventative Maintenance	1.8	98861	\$ 840,318.50	3.45	154120	\$ 1,310,020.00
	Fair	Rehabilitation	2.48	109532	\$ 1,971,576.00	2.27	108162	\$ 1,946,916.00
	Poor	Reconstruction	1.47	63506	\$ 2,857,770.00	0.2	8752	\$ 393,840.00
	Total		6.22		\$ 5,687,603.75	5.92		\$ 3,650,776.00
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Petersham	Excellent	Routine Maintenance	0.67	28102	\$ 21,076.50	4.06	170443	\$ 127,832.25
	Good	Preventative Maintenance	1.26	43960	\$ 373,660.00	8.44	357007	\$ 3,034,559.50
	Fair	Rehabilitation	3.97	151190	\$ 2,721,420.00	–	–	–
	Poor	Reconstruction	1.24	52310	\$ 2,353,950.00	–	–	–
	Total		7.14		\$ 5,470,106.50	12.5		\$ 3,162,391.75
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Phillipston	Excellent	Routine Maintenance	–	–	–	2.92	123235	\$ 92,426.25
	Good	Preventative Maintenance	0.55	20589	\$ 175,006.50	1.82	73519	\$ 624,911.50
	Fair	Rehabilitation	3.26	118481	\$ 2,132,658.00	2.31	99779	\$ 1,796,022.00
	Poor	Reconstruction	0.68	24084	\$ 1,083,780.00	–	–	–
	Total		4.49		\$ 3,391,444.50	7.05		\$ 2,513,359.75
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Royalston	Excellent	Routine Maintenance	0.02	750	\$ 562.50	–	–	–
	Good	Preventative Maintenance	1.88	68256	\$ 580,176.00	–	–	–
	Fair	Rehabilitation	4.47	158696	\$ 2,856,528.00	–	–	–
	Poor	Reconstruction	8.76	300193	\$ 13,508,685.00	–	–	–
	Total		15.13		\$ 16,945,951.50	0		\$ -

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		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Shirley	Excellent	Routine Maintenance	0.84	35680	\$ 26,760.00	0.54	28859	\$ 21,644.25
	Good	Preventative Maintenance	—	—	—	1.45	6850	\$ 58,225.00
	Fair	Rehabilitation	1.19	47873	\$ 861,714.00	1.24	57852	\$ 1,041,336.00
	Poor	Reconstruction	0.17	5840	\$ 262,800.00	0.3	16754	\$ 753,930.00
	Total		2.2		\$ 1,151,274.00	3.53		\$ 1,875,135.25
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Sterling	Excellent	Routine Maintenance	0.15	3251	\$ 2,438.25	6.54	233984	\$ 175,488.00
	Good	Preventative Maintenance	4.69	196195	\$ 1,667,657.50	13.34	624773	\$ 5,310,570.50
	Fair	Rehabilitation	4.41	187038	\$ 3,366,684.00	1.56	58739	\$ 1,057,302.00
	Poor	Reconstruction	0.8	29908	\$ 1,345,860.00	3.3	136466	\$ 6,140,970.00
	Total		10.05		\$ 6,382,639.75	24.74		\$ 12,684,330.50
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Templeton	Excellent	Routine Maintenance	1.23	44213	\$ 33,159.75	13.45	578791	\$ 434,093.25
	Good	Preventative Maintenance	1.12	46647	\$ 396,499.50	5.1	242406	\$ 2,060,451.00
	Fair	Rehabilitation	2.09	88268	\$ 1,588,824.00	3.26	151192	\$ 2,721,456.00
	Poor	Reconstruction	2.52	101833	\$ 4,582,485.00	1.39	76810	\$ 3,456,450.00
	Total		6.96		\$ 6,600,968.25	23.2		\$ 8,672,450.25
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Townsend	Excellent	Routine Maintenance	0.11	4814	\$ 3,610.50	0.07	2915	\$ 2,186.25
	Good	Preventative Maintenance	2.72	119582	\$ 1,016,447.00	2.07	80077	\$ 680,654.50
	Fair	Rehabilitation	0.87	39903	\$ 718,254.00	2.54	98163	\$ 1,766,934.00
	Poor	Reconstruction	1.97	86805	\$ 3,906,225.00	1.88	72925	\$ 3,281,625.00
	Total		5.67		\$ 5,644,536.50	6.56		\$ 5,731,399.75
		Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
Westminster	Excellent	Routine Maintenance	1.04	44056	\$ 33,042.00	12.39	609356	\$ 457,017.00
	Good	Preventative Maintenance	0.1	4038	\$ 34,323.00	6.12	274637	\$ 2,334,414.50
	Fair	Rehabilitation	3.25	121240	\$ 2,182,320.00	2.98	138166	\$ 2,486,988.00
	Poor	Reconstruction	0.24	10159	\$ 457,155.00	0.46	23591	\$ 1,061,595.00
	Total		4.63		\$ 2,706,840.00	21.95		\$ 6,340,014.50

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Winchendon

	Repair Category	Miles	Square Yards	Repair Cost	Miles	Square Yards	Repair Cost
<b>Excellent</b>	Routine Maintenance	4.29	275321	\$ 206,490.75	–	–	–
<b>Good</b>	Preventative Maintenance	10.86	561670	\$ 4,774,195.00	0.47	20056	\$ 170,476.00
<b>Fair</b>	Rehabilitation	2.52	124234	\$ 2,236,212.00	–	–	–
<b>Poor</b>	Reconstruction	1.61	76235	\$ 3,430,575.00	–	–	–
	<b>Total</b>	19.28		<b>\$ 10,647,472.75</b>	0.47		<b>\$ 170,476.00</b>

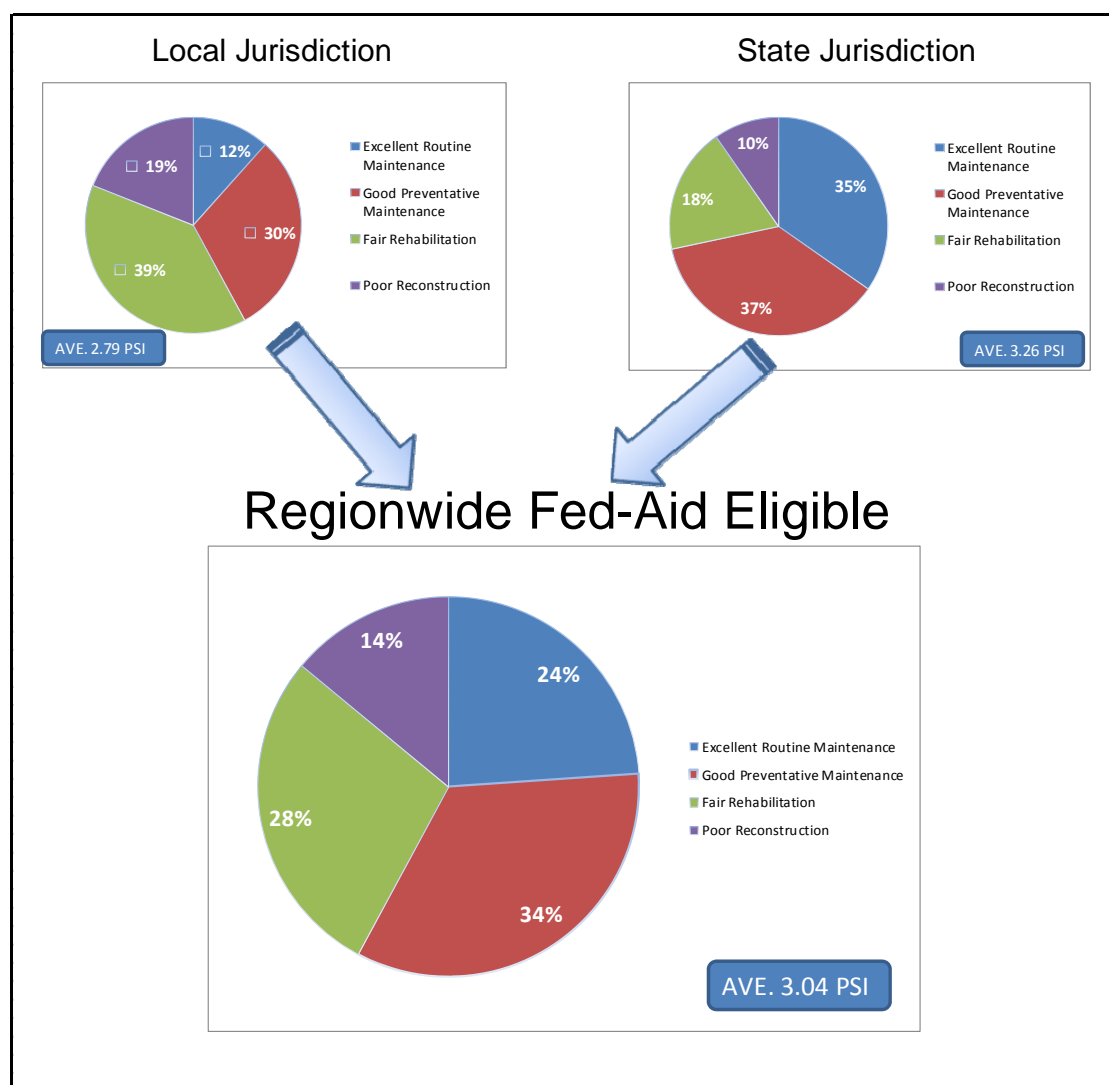


### Pavement Maintenance Needs on the Montachusett Region's Federal Aid Eligible Roads

City/Town	Local Jurisdiction Federal Aid Roads					State Jurisdiction Federal Aid Roads					Total Combined Repairs
	Fed Aid Mileage	Mileage Surveyed	Repairs	Ave. Repair/Mile	Total Weighted	Fed Aid Mileage	Mileage Surveyed	Repairs	Ave. Repair/Mile	Total Weighted	
Ashburnham	9.6	7.9	\$6,640,859	\$840,615	\$8,069,905	8.55	8.55	\$8,844,829	\$1,034,483	\$8,844,829	\$16,914,733
Ashby	0	0	\$0	—	—	11.68	11.68	\$10,131,350	\$867,410	\$10,131,350	\$10,131,350
Athol	18.19	6.49	\$7,097,736	\$1,093,642	\$19,893,345	14.19	12.9	\$5,057,789	\$392,077	\$5,563,568	\$25,456,913
Ayer	12.62	2.36	\$3,282,406	\$1,390,850	\$17,552,526	4.1	4.03	\$2,303,242	\$571,524	\$2,343,248	\$19,895,774
Clinton	15.98	7.01	\$10,863,763	\$1,549,752	\$24,765,039	1.62	1.55	\$2,134,769	\$1,377,270	\$2,231,177	\$26,996,217
Fitchburg	50.07	20.5	\$24,108,890	\$1,176,043	\$58,884,493	15.32	12.89	\$7,958,121	\$617,387	\$9,458,372	\$68,342,865
Gardner	22.82	11.03	\$8,521,563	\$772,581	\$17,630,287	18.8	16.59	\$11,492,383	\$692,730	\$13,023,316	\$30,653,603
Groton	28.28	11.23	\$8,125,178	\$723,524	\$20,461,266	5.53	5.43	\$3,524,743	\$649,124	\$3,589,655	\$24,050,922
Harvard	0	6.67	\$4,444,019	\$666,270	\$0	16.76	16.38	\$2,568,023	\$156,778	\$2,627,599	\$2,627,599
Hubbardston	21.51	14.04	\$9,177,388	\$653,660	\$14,060,229	0.01	0.01	\$34,200	\$3,420,000	\$34,200	\$14,094,429
Lancaster	11.04	15.34	\$10,559,523	\$688,365	\$7,599,553	19.74	15.1	\$10,766,998	\$713,046	\$14,075,532	\$21,675,085
Leominster	38.55	14.39	\$16,382,153	\$1,138,440	\$43,886,865	23.03	16.24	\$7,530,417	\$463,696	\$10,678,910	\$54,565,775
Lunenburg	27.44	6.22	\$5,687,604	\$914,406	\$25,091,294	5.94	5.92	\$3,650,776	\$616,685	\$3,663,110	\$28,754,403
Petersham	6.75	7.14	\$5,470,107	\$766,121	\$5,171,319	12.77	12.5	\$3,162,392	\$252,991	\$3,230,699	\$8,402,019
Phillipston	2.72	4.49	\$3,391,445	\$755,333	\$2,054,505	8.67	7.05	\$2,513,360	\$356,505	\$3,090,898	\$5,145,403
Royalston	20.9	15.13	\$16,945,952	\$1,120,023	\$23,408,486	0	0	\$0	—	—	\$23,408,486
Shirley	15.98	2.2	\$1,151,274	\$523,306	\$8,362,436	3.91	3.53	\$1,875,135	\$531,200	\$2,076,991	\$10,439,427
Sterling	12.33	10.05	\$6,382,640	\$635,089	\$7,830,642	28.48	24.74	\$12,684,331	\$512,705	\$14,601,849	\$22,432,490
Templeton	13.45	6.96	\$6,600,968	\$948,415	\$12,756,181	27.06	23.2	\$8,672,450	\$373,813	\$10,115,367	\$22,871,548
Townsend	16.88	5.67	\$5,644,537	\$995,509	\$16,804,193	6.56	6.56	\$5,731,400	\$873,689	\$5,731,400	\$22,535,593
Westminster	11.49	4.63	\$2,706,840	\$584,631	\$6,717,406	26.35	21.95	\$6,340,015	\$288,839	\$7,610,906	\$14,328,312
Winchendon	27.74	19.28	\$10,647,473	\$552,255	\$15,319,548	0.47	0.47	\$170,476	\$362,715	\$170,476	\$15,490,024
	384.34			\$880,420	\$356,319,517	259.54			\$720,222	\$132,893,451	<b>\$489,212,968</b>

### All Federal Aid Eligible Roads

In 2010 the Federal Highway Administration (FHWA) recommended that Regional Planning Agencies such as the MRPC undertake a study to establish the cost of maintaining the federal aid eligible roadway system, particularly those federal aid eligible roads in which maintenance and repairs are the responsibility of the cities and towns in the region (Local Jurisdiction). Comparing the conditions between Local and State Jurisdiction federal aid eligible roads it is clear that those federal aid roads routinely maintained by cities and towns are in worse condition than those routinely maintained by the State (State Jurisdiction). In fact the average repair need of \$880,420 per mile on Local Jurisdiction roads is 18.2% higher than the \$720,222 per mile average repair need for State Jurisdiction roads. The pie charts below display the roadway condition averages of both Local and State Jurisdiction federal aid eligible roadways in the region.



The preceding pie charts show the overall conditions of the federal aid eligible network of roads in the Montachusett region broken up by Jurisdiction. Analysis of the conditions show that the overall condition is “Good” (3.26 PSI) on the federal aid State Jurisdiction network while Local Jurisdiction roads are rated an average of “Fair” (2.79 PSI). Overall the federal aid eligible network has an average of “Good” (3.04 PSI).

From the figures calculated it is estimated that in order to repair all federal aid eligible roads to an excellent condition would cost approximately \$489,212,968. This includes \$356,319,517 for those federal aid roads under local jurisdiction. From calculations outlined in Chapter 20 Financial, based upon past trends, and anticipating that the MPO will continue to make the same level of commitment in the future, approximately \$257,953,538 in Regional Discretionary funds is available to address pavement needs on federal aid Local Jurisdiction roads. Therefore, anticipated needs will likely exceed available funds. The table below, “Example A”, is an example of how these funds could be used to address pavement needs on these Local Jurisdiction roads.

<b>Regional Discretionary Funding - Projected 2012 - 2035 - Example A</b>					
<b>\$257,953,538</b>					
	Routine Maintenance	Preventative Maintenance	Rehabilitation	Reconstruction	Totals
<b>Miles of Needed Repairs</b>	44.51	117.3	149.59	72.91	384.31
<b>Average Repair Cost Per Mile</b>	\$39,636	\$418,734	\$866,207	\$2,135,766	—
<b>Percent of Total Allocations</b>	0.69%	19.00%	45.31%	35.00%	100.00%
<b>Allocated Dollars</b>	\$1,779,879	\$49,011,172	\$116,878,748	\$90,283,738	\$257,953,538
<b>Miles of Repairs Funded</b>	44.91	117.05	134.93	42.27	339.16

In order to maintain the network in an overall “Good” condition, the anticipated available funds need to be directed in an efficient manner to maximize results. This could be achieved by continued encouragement of local communities to utilize a pavement management approach to address local federal aid roads within their jurisdiction.

## Chapter 5 – Infrastructure

<b>Regional Discretionary Funding - Projected 2012 - 2035 - Example B</b>					
<b>\$257,953,538</b>					
	Routine Maintenance	Preventative Maintenance	Rehabilitation	Reconstruction	Totals
<b>Miles of Needed Repairs</b>	44.51	117.3	149.59	72.91	384.31
<b>Average Repair Cost Per Mile</b>	\$39,636	\$418,734	\$866,207	\$2,135,766	—
<b>Percent of Total Allocations</b>	0.69%	19.00%	55.31%	25.00%	100.00%
<b>Allocated Dollars</b>	\$1,779,879	\$49,011,172	\$142,674,102	\$64,488,385	\$257,953,538
<b>Miles of Repairs Funded</b>	44.91	117.05	164.71	30.19	356.86

Example B from the above table shows an increase in the amount of roadway miles that could be repaired by relying on doing more preventative maintenance and rehabilitation projects rather than full reconstruction jobs which eat up funding. Also as a result of this approach, roads previously in “Fair” condition would be repaired before they deteriorate even more and are in need of a costly reconstruction, adding to the backlogged cost of needed repairs. Over time it is assumed that the overall condition of the federal aid network would improve. Consistently allowing full reconstruction projects to eat up available funding would most likely result in an overall deterioration of the networks conditions.

### Local Jurisdiction Roads

The difference in condition between Local and State Jurisdiction federal aid roads may mainly be a combination of two factors, the first being that federal aid roads that are State Jurisdiction are a higher Functional Classification than those that are Local Jurisdiction, giving them higher importance when prioritizing projects for funding and the second being the funding available to Municipalities for roadway maintenance (Chapter 90) lagging behind the rising price of such maintenance. Below is a chart showing the Chapter 90 allocations each community in the region will receive in FY 2012 along with the roadway mileage that that money must maintain. Table follows on next page.

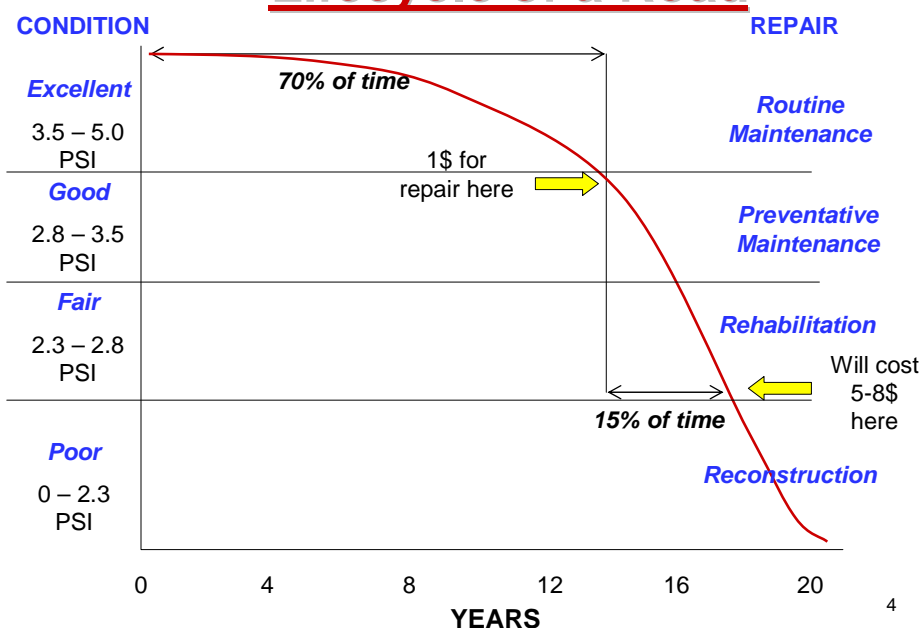
CITY OR TOWN	Local Jurisdiction Miles (Fed Aid and Non- Fed Aid eligible)	FY 2012 Ch. 90 Apportionment
ASHBURNHAM	74.47	\$349,927
ASHBY	51.93	\$230,973
ATHOL	96.41	\$504,450
AYER	32.55	\$292,570
CLINTON	47.23	\$334,982
FITCHBURG	179.85	\$1,144,927
GARDNER	92.62	\$607,930
GROTON	99.76	\$509,677
HARVARD	64.85	\$312,785
HUBBARDSTON	82.98	\$366,117
LANCASTER	59.21	\$316,605
LEOMINSTER	151.35	\$1,100,419
LUNENBURG	83.02	\$426,148
PETERSHAM	62.29	\$258,585
PHILLIPSTON	44.76	\$191,993
ROYALSTON	69.56	\$287,724
SHIRLEY	43.68	\$251,563
STERLING	84.99	\$420,694
TEMPLETON	67.96	\$345,254
TOWNSEND	86.89	\$432,271
WESTMINSTER	84.78	\$418,647
WINCHENDON	91.00	\$451,348
	1752.16	\$9,555,586

Pavements are often the single largest expense in any municipal road maintenance budget. Chapter 90 allocations often do not provide sufficient funding to maintain local roads at the current condition let alone make major improvements. Due to inadequate funding it is recommended that communities routinely target funding for federal aid eligible Local roadways through the Transportation Improvement Program (TIP). It is also encouraged that a Pavement Management Plan be implemented by communities to keep on track of maintenance needs and schedules to contribute to a cost effective approach to maintaining roadways.

The chart below displays the concept of lifecycle cost. A pavements lifecycle is the time between reconstruction periods. Lifecycle cost is the total cost spent on maintenance and repairs for a particular pavement section during its life cycle. One of the main focuses of pavement management is to keep lifecycle cost low to stretch the dollar in what is commonly an ever decreasing maintenance budget.



## Lifecycle of a Road



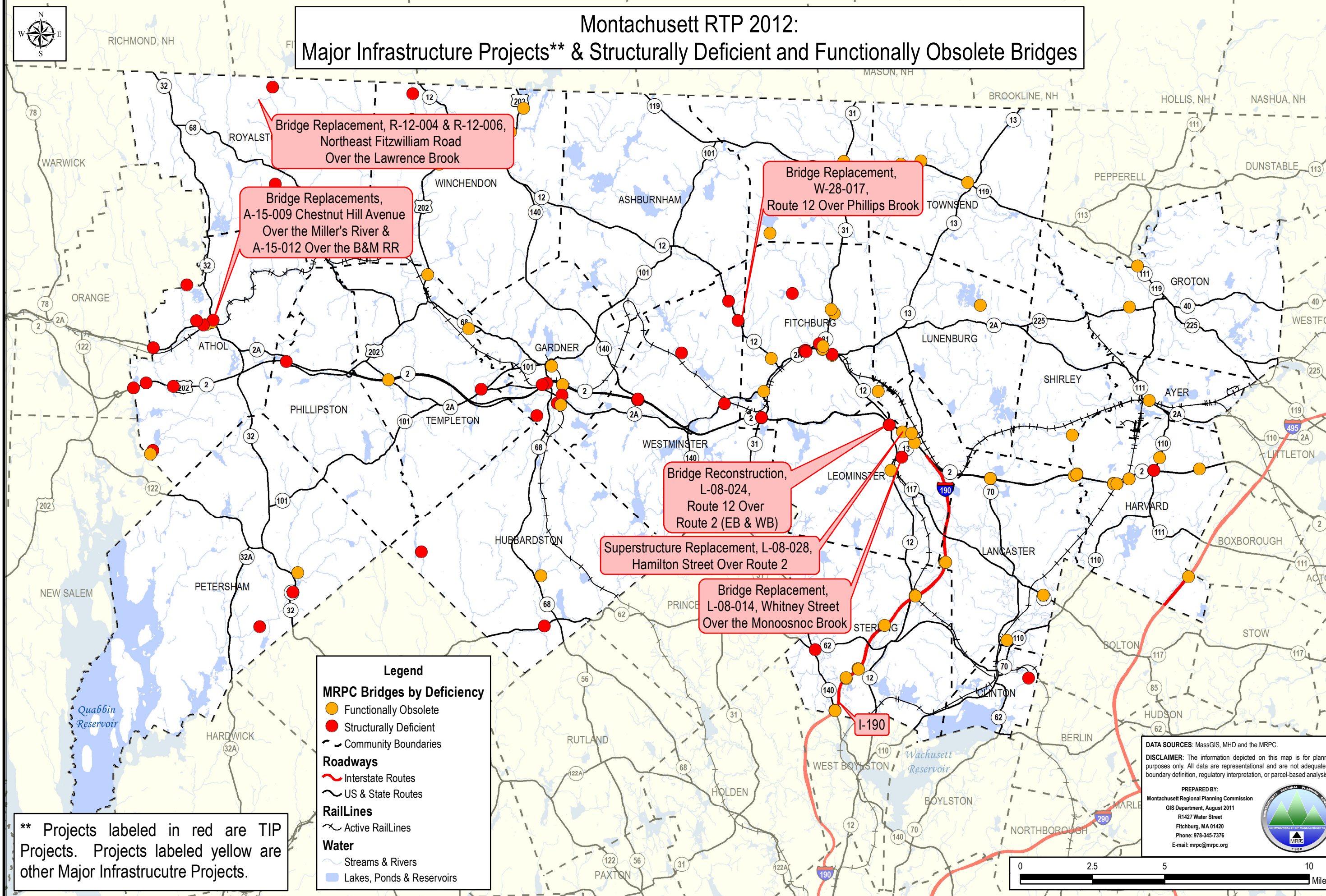
In 2008 MRPC surveyed communities in the Montachusett region about their involvement in municipal Pavement Management System activities. Local municipal programs range from non-existent to basic annually maintained spreadsheets to ongoing contracts with consultants utilizing the latest Pavement Management software to analyze town roadways. Although a pavement management program does involve additional costs on top of maintenance budgets, many communities are realizing their potential to save money by making well informed decisions in the long run. The costs and benefits of utilizing a Pavement Management System should be weighed and discussed with the appropriate decision makers.

### Recommendations for Pavement Activities

The following are recommendations which are aimed at maintaining or improving the overall condition of the federal aid eligible network of pavements in the region.

- Encourage communities to embrace the principals of pavement management on local roads to increase the lifecycle of local pavements and maximize the value of monies spent on pavements.
- Whenever possible, consider the principals of pavement management when evaluating prospective projects on the TIP.





# Montachusett RTP 2012: Major Infrastructure Projects\*\* & Structurally Deficient and Functionally Obsolete Bridges

Bridge Replacement, R-12-004 & R-12-006,  
Northeast Fitzwilliam Road  
Over the Lawrence Brook

Bridge Replacements,  
A-15-009 Chestnut Hill Avenue  
Over the Miller's River &  
A-15-012 Over the B&M RR

Bridge Replacement,  
W-28-017,  
Route 12 Over Phillips Brook

Bridge Reconstruction,  
L-08-024,  
Route 12 Over  
Route 2 (EB & WB)

Superstructure Replacement, L-08-028,  
Hamilton Street Over Route 2

Bridge Replacement,  
L-08-014, Whitney Street  
Over the Monoosnoc Brook

**Legend**

**MRPC Bridges by Deficiency**

- Functionally Obsolete
- Structurally Deficient
- Community Boundaries

**Roadways**

- Interstate Routes
- US & State Routes

**RailLines**

- Active RailLines

**Water**

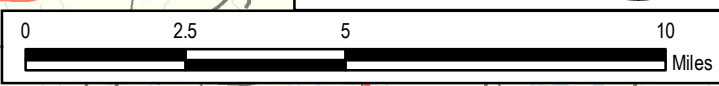

- Streams & Rivers
- Lakes, Ponds & Reservoirs

\*\* Projects labeled in red are TIP Projects. Projects labeled yellow are other Major Infrastrucutre Projects.

**DATA SOURCES:** MassGIS, MHD and the MRPC.

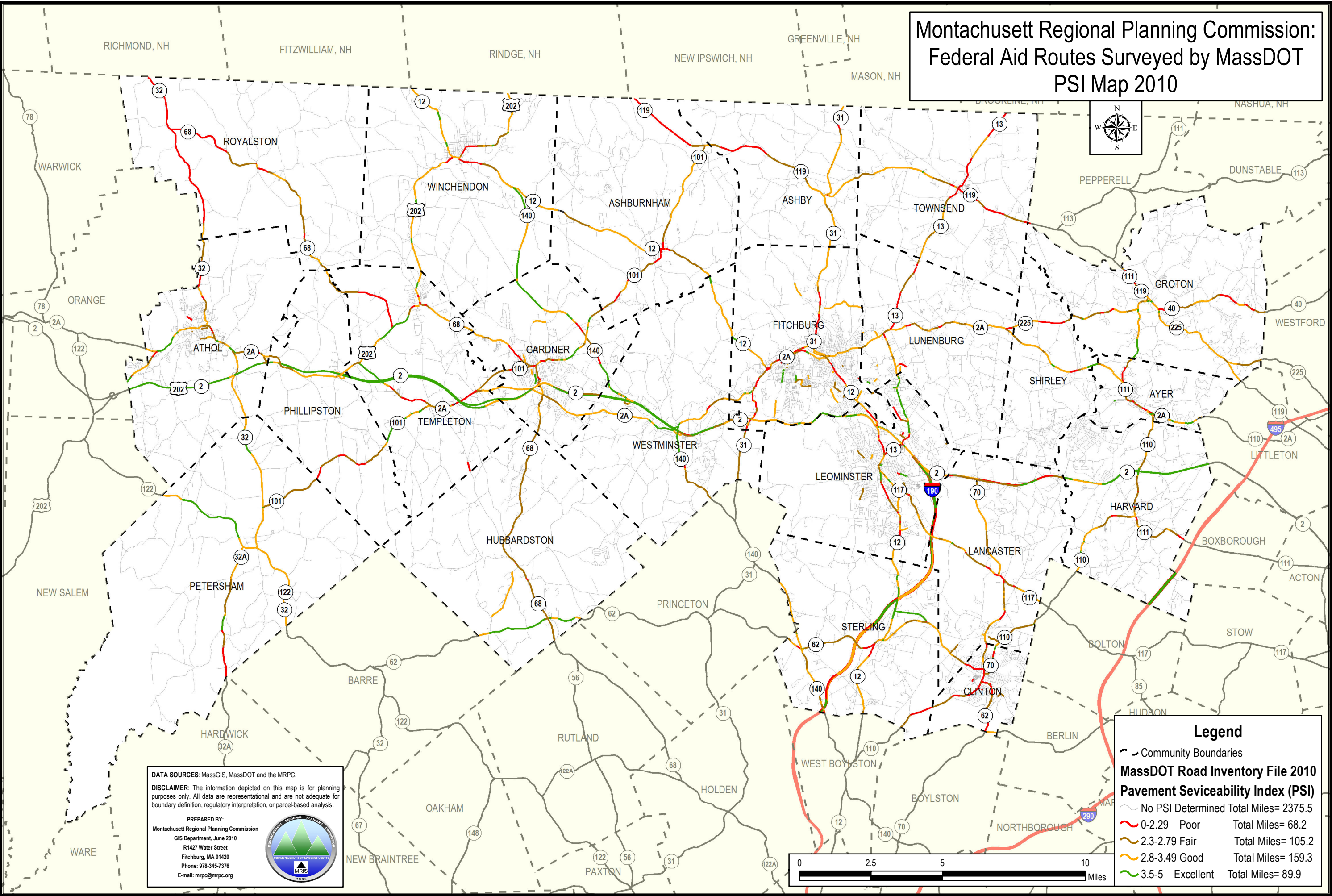
**DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

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# Montachusett Regional Planning Commission: Federal Aid Routes Surveyed by MassDOT PSI Map 2010



**DATA SOURCES:** MassGIS, MassDOT and the MRPC.

**DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

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**Legend**

Community Boundaries

**MassDOT Road Inventory File 2010  
Pavement Seviceability Index (PSI)**

No PSI Determined	Total Miles= 2375.5
0-2.29 Poor	Total Miles= 68.2
2.3-2.79 Fair	Total Miles= 105.2
2.8-3.49 Good	Total Miles= 159.3
3.5-5 Excellent	Total Miles= 89.9