

## TRANSPORTATION

This section overviews the condition, use, and maintenance requirements of the road system in Franklin County. The section discusses the county's road and bridge infrastructure and maintenance, traffic count and accident data, and alternative roadway design standards that have been developed to help preserve the character of rural roads and rural areas, such as Franklin County.

### Transportation Infrastructure

#### Road Mileage and Functional Classification

Roads are functionally classified based on the service that they are intended to provide within the road network. The classification system ranks roads in a hierarchy based on function, and the classifications determine which roads are eligible for federally-funded improvement projects through the Transportation Improvement Program (TIP) coordinated by the Franklin Regional Council of Governments (FRCOG).

The American Association of State Highway and Transportation Officials (AASHTO) developed the functional classification system used by transportation professionals. According to AASHTO, there are eleven different road classifications and they can be grouped into the following seven categories:

1. Interstates
2. Rural Principal Arterials and Urban Extensions
3. Rural Minor Arterials and Urban Extensions
4. Other Urban Principal Arterials
5. Rural Major Collectors and Urban Minor Arterials
6. Rural Minor Collectors and Urban Collectors
7. Rural Local and Urban Local

Beyond these categories, roads are further classified based on whether they are located in urban or rural areas. For functional classification purposes, urban areas are defined as those places within boundaries set by state and local officials having a population of 5,000 or more.<sup>2</sup> Below are the definitions of the seven primary classifications.

1. **Interstates:** highways that serve substantial statewide or interstate travel. Includes some principal arterials, both urban and rural. Interstates always have limited access.
2. **Rural Principal Arterials and Urban Extensions :** highways that serve substantial statewide or intercity travel. These highways typically comprise a small fraction of the rural road network, but carry a high proportion of the area's total traffic.
3. **Rural Minor Arterials and Urban Extensions :** roadways that link cities with large towns to form an integrated intercity and intercounty travel network. Minor arterial roads should provide for relatively high overall speed with minimum interference to through movement.

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<sup>2</sup> AASHTO, A Policy on Geometric Design of Highways and Street, 1994.



## Pavement Management

A Pavement Management System (PMS) as defined by the American Public Works Association (APWA) is “a systematic method for routinely collecting, storing, and retrieving the kind of decision-making information needed (about pavement) to make maximum use of limited maintenance and construction dollars.”

Historically, road maintenance funds were channeled to those roads that were perceived by local highway superintendents to be in the worst condition, or where political influence dictated. Various studies have indicated that a pavement maintained in a perpetual “good” to “excellent” condition, requires one-fourth to one-fifth the investment of pavement that is not as well maintained and that is rehabilitated only once it reaches “poor” or “failed” condition. A PMS is designed to provide quantitative information to support repair and budget decisions that reflect these findings and focus on keeping pavement in good or excellent condition.

Figure 1 displays the general life cycle of an asphalt pavement. Under normal conditions of consistent weather and traffic patterns, a pavement will deteriorate by 40 percent in the first 75 percent of its life. During the next 12 percent of its life, the pavement will deteriorate by another 40 percent. With proper timing of preventative maintenance measures during the first three-quarters of a pavement’s life, many years can be added to the functionality of a road at a lower overall cost.

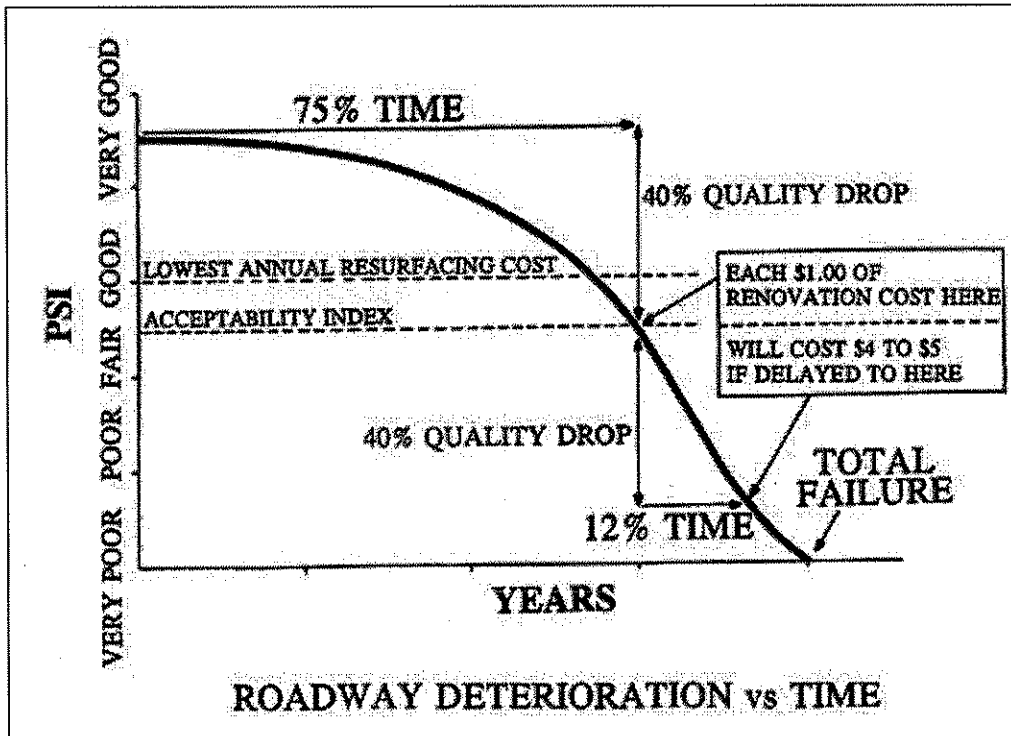
With limited availability of transportation funding, it is more important than ever to make cost-effective decisions regarding pavement maintenance. A formalized PMS improves on the existing practices that most highway departments already employ, and enhances professional judgment through a standardized approach and guidelines. It also provides highway departments and town officials with pavement data that can be used to levy additional funding from either Town Meeting or State or Federal sources. A PMS is generally based on a computer software database that has been developed from years of research on the function and longevity of pavement materials and the effects of different repair timing strategies. Based on this information, a PMS can help determine the most cost-effective method for repairing a particular roadway, the most appropriate timeframe for making a repair, and the cost of maintaining the roadway at the desirable condition level.

The Franklin Regional Council of Governments has been involved in pavement management activities since the early 1990s. In 1997, the FRCOG completed a three-year pavement management contract with MassHighway under which nearly 500 miles of federal-aid and State Transportation Program (STP) funded roads within Franklin County were surveyed and analyzed. Unfortunately, this contract was not renewed due to a lack of available state funds. Nonetheless, the FRCOG remains committed to continuing Pavement Management activities to the extent possible. This is primarily accomplished in two ways. First, on the regional level, the FRCOG continues to discuss PMS processes and applications with other Regional Planning Agencies (RPAs) in the State. This communication allows the regions to maintain at least a minimal level of statewide PMS information, and is helpful for brainstorming ways to make the most of limited funding. Second, the FRCOG has devoted 3C planning funds to update road distress data annually on some of region’s federal-aid and STP roadways.

**Map 1: Functional Classification of Franklin County Roads**



**Figure 1: Life Cycle of Asphalt Pavement**



Source: MassHighway Department, 1996 Pavement Management Program Technical Report.

In addition, on the local level, the FRCOG is available, typically on a fee basis, to assist towns in completing their own pavement management analyses. The FRCOG either can collect pavement distress data on a town's roadways or can train town personnel to collect the data themselves. The FRCOG can then use its pavement management software to analyze the collected information and provide the town with a personalized report. Over the last several years, the FRCOG has provided pavement management analyses to towns working on local or regional planning initiatives, including town Master Plans. When possible, the FRCOG will provide towns with PMS information that was developed in conjunction with other FRCOG activities free of charge. However, in many circumstances, towns interested in having a local PMS will need to make funds available to pay for the data collection and/or analysis. The FRCOG will work with towns interested in having a pavement management analysis performed and will help find a way to fund this analysis, using whatever combination of resources best fits the particular circumstances.

Bridge Network

Bridges are a critical component of the Franklin County roadway network and maintaining the safety and functionality of bridges a top priority. Bridges are predominantly under the domain of the State. They are inspected regularly by the Massachusetts Highway Department, and are rated according to guidelines established by the American Association of State Highway and Transportation Officials (AASHTO). The purpose of the AASHTO ratings is to provide a standard to compare the status of bridges within a region and across the country. Many factors are

considered when developing the AASHTO rating for a particular bridge, including the bridge's structural integrity, the road's functional classification, and the bridge's designed purpose.

The AASHTO scale runs from 0 to 100, with a 100 being a perfect score. Generally, bridges must have an AASHTO rating of 75 or less to be eligible for repair, and a rating of 50 or less to be eligible for replacement. A priority list for future bridge projects is developed largely based on the AASHTO ratings, as well as other criteria. For example, if a bridge is classified as "structurally deficient" or "functionally obsolete," it can raise that bridge's ranking on the priority list. Bridges may be determined to be "structural deficient" if they need serious rehabilitation or a vital, but relatively minor, structural repair. Bridges may be designated as "functionally obsolete" if they are structurally sound but have inadequate capacity to fulfill their current function. One example of a functionally obsolete bridge is a two-lane bridge that is accessed via a four-lane road; if the bridge is not widened, it may create a traffic bottleneck in its vicinity and be insufficient to accommodate current roadway volumes.

The latest bridge listing from MassHighway, dated April 2001, indicates that Franklin County has 289 bridges. This listing is provided for reference in Appendix 2. Most of the bridges in the county are under the jurisdiction of the towns or the State, and only a few are privately owned or controlled by other parties. The MassHighway listing shows that of the 289 bridges, almost half (143) have AASHTO ratings of 75 or under, and one-sixth (45) have ratings of 50 or under. Twenty-eight of the bridges with a rating of 50 or under (62%) are considered to be structurally deficient and 11 others (24%) are designated as functionally obsolete. Table 10 lists all the structurally deficient bridges in Franklin County that have an AASHTO rating of 50 or less. Four of these bridges are in Montague, four in Charlemont, and three each in Conway and Erving. Together, the bridges in these four towns account for half the bridges listed in the table. The remaining bridges are spread across ten other towns in the county.

The Transportation Improvement Program (TIP) is a prioritized multi-year listing of transportation projects in the region that are expected to receive federal funding. In Franklin County, the TIP is created and maintained by the Franklin Regional Council of Governments (FRCOG). It is updated annually and lists projects for the coming six-year (federal fiscal year) period. The FRCOG recently finished developing the TIP for FY 2002-2007. This TIP takes effect on October 1, 2001. It is important to note that while the TIP usually includes both federal-funded and state-funded projects, it is only required to list federally-funded projects. At the same time, most bridge projects are funded with State monies (also called Non-Federal Aid). Therefore, while the FRCOG makes every effort to maintain an accurate TIP listing of both federally and state-funded projects, some bridge projects may not appear on the TIP due to their state funding status. Simply because a bridge is not on the TIP does not mean that it is not moving forward; many other factors besides funding contribute to the advancement of bridge design and reconstruction.

The 2002-2007 TIP includes projects to replace, reconstruct, or rehabilitate 29 bridges in Franklin County. These bridges are identified in Appendix 2 under the "TIP Listed" column. Twenty-one of the bridges in the TIP (75%) are characterized as "Structurally Deficient" and three others (11%) are designated as "Functionally Obsolete." All but one of the TIP bridges have AASHTO ratings of 75 or less, and half have AASHTO ratings of 50 or less.

**Table 10: Structurally Deficient Bridges with an AASHTO Rating of 50 or Less**

*Bridges listed from lowest (worst) AASHTO Rating to highest.*

Town	Bridge Number	Road/Location	Under Bridge	AASHTO Rating	TIP Listed
Greenfield	G-12-010	Eunice Williams Dr	Green River	17	Yes
Montague	M-28-028	Prospect St	Spring St	19	Yes
Charlemont	C-05-029	Maxwell Rd	Maxwell Brook	21	No
Montague	M-28-035	Davis Rd	Lyons Brook	23	No
Conway	C-20-013	Reeds Bridge Rd	South River	24	No
Charlemont	C-05-006	Mountain Rd	Mill Brook	25	Yes
Orange	O-03-003	Royalston Rd	West Branch Tully River	25	No
Colrain	C-18-017	White Archambo Rd	West Branch North River	26	No
Whately	W-33-007	Westbrook Rd	West Brook	30	No
Conway	C-20-014	Reeds Bridge Rd	South River	31	Yes
Montague	M-28-022	South St	Sawmill River	34	No
Deerfield	D-06-044	I-91 Northbound	Deerfield River, Stillwater Rd	34	No
Erving	E-10-008	Arch St	Millers River	35	No
Montague	M-28-023	Meadow Rd	Sawmill River	35	No
Erving	E-10-002	MA Route 63, Bridge St	Millers River	36	Yes
Whately	W-33-008	Westbrook Rd	West Brook	36	No
Shelburne	S-11-008	Colrain/Greenfield Rd	Hinsdale Brook	37	Yes
Charlemont	C-05-026	South River Rd	Bozrah Brook	37	Yes
Charlemont	C-05-005	MA Route 8A, North Heath Rd	Mill Brook	40	Yes
New Salem	N-09-003	Reg. Dam Rd	Quabbin Reservoir	43	No
Greenfield	G-12-020	Montague City Rd	Connecticut River	43	Yes
Conway	C-20-003	North Poland Rd	Poland Brook	45	No
Deerfield	D-06-001	Upper Rd	Deerfield River	45	No
Ashfield	A-13-010	MA Route 116, Plainville Rd	Swift River	46	No
Buckland	B-28-011	Upper St	Clesson Brook	46	No
Orange	O-03-008	MA Route 122, S Main St	Millers River	47	Yes
Northfield	N-22-010	Birnam Rd	Mill Brook	48	Yes
Erving	E-10-016	MA Route 2	MA Route 63	48	Yes

Note: Bridge numbers are coded, as in this example: A-13-004, Ashfield is the 13<sup>th</sup> municipality in the state starting with the letter "A" and this is the fourth bridge in the town.

Source: MassHighway April 2001 Bridge Listing, and the Franklin County Transportation Improvement Program FY 2002-2007.

## Traffic Volumes

### Traffic Counts and AADTs

MassHighway has collected traffic count data at approximately 75 locations in Franklin County since the early 1980s. In 1991, the FRCOG transportation planning staff began conducting its own traffic counts, gathering traffic volume data both at some of the MassHighway sites and at other places in the region. Since 1991, traffic counts have been conducted at over 430 locations in Franklin County. These locations are shown in Map 2, and all the traffic counts are shown by town in Appendix 3. The traffic counts in Appendix 3 are not the actual number of vehicles counted at each location, but the average Annual Daily Traffic (AADT) volumes. An AADT is the 24-hour traffic volume for a particular location averaged over the entire year, and is based on traffic counts

conducted over at least two full weekdays. The counts at each are averaged and then multiplied by a seasonal adjustment factor to reach the AADT estimate.

MassHighway maintains a number of permanent traffic counters throughout the state. These counters collect data 24 hours a day, 365 days a year. These data measure how traffic volumes vary by time of year, and they serve as the basis for the seasonal adjustments used to produce the AADTs. Only four of the permanent traffic counters statewide are situated in Franklin County; they are located on major roads in Bernardston, Buckland, and Deerfield. Most of the permanent counters are in the eastern part of the state. One potential issue in Franklin County is that the data and seasonal variations recorded at the four Franklin County sites may not be completely indicative of the seasonal trends on other roadways in the region. As a result, the seasonal adjustments to the traffic counts to produce the AADTs may not be entirely appropriate.

Another broader potential issue is the precision of the traffic count data to begin with. Traffic counts are generally a snapshot of the traffic volumes at a particular location over a few consecutive days. The traffic on these days may or may not be representative of the traffic at this location more generally. It is important that, when possible, counts be conducted at specific sites more than once to allow for comparisons between the data and the development more accurate traffic volume estimates. Of the more than 430 locations in Franklin County where traffic counts were conducted during the 1991-2000 period, over 60 percent had AADTs for only one year, so that no comparisons between years could be made. Less than 10 percent of the sites had AADTs for 5 years or more and only two (Route 112 at the Buckland-Ashfield town line and Route 2 in Erving west of Mountain Road) had AADTs for all 10 years. Despite the potential issues with traffic counts and AADTs, they are still useful to communities and helpful for assessing traffic volumes and traffic conditions, and even a brief snapshot of current traffic levels is better than no information at all. In addition, in recent years, efforts have been made to conduct traffic counts at a greater number of sites in Franklin County each year. In 1991, traffic counts took place at 65 locations in the county. By 2000, that number had almost doubled to 124. Additionally, many of the counts in recent years have been on local roads which comprise the bulk of Franklin County's road network, but for which traffic volume estimates were previously unavailable.

**Map 2: Traffic Count Locations in Franklin County, 1991-2000**



Traffic Growth on Area Arterial Roadways

Traffic growth can be measured by examining traffic levels over time at the same location. As shown in Appendix 3, in Franklin County, close to 170 sites have AADT estimates for two or more years over the past decade, which enables comparison of traffic volumes for different years and an analysis of traffic trends. The FRCOG has analyzed data from these locations to assess changes in traffic volumes over time and estimated the average annual traffic growth rates (AGR) for the various functional classifications of roads. Table 11 displays AGRs for locations along Interstate 91, and Table 12 shows AGRs for sites on Route 2. Table 13 indicates AGRs for locations on various minor arterials in Franklin County. All three tables also show the AADTs for two different years; these AADTs formed the basis for the AAG calculations. Depending on what data are available at each location, the first year used was either 1994 or 1995, and the second year was 1998, 1999, or 2000.

**Table 11: Average Annual Growth in Traffic along the I-91 Corridor**

Town	Roadway	Location	Past Year Count		Most Current Count		Avg Annual Growth Rate
			Year	AADT*	Year	AADT*	
Bernardston	I-91	Greenfield Town Line	1994	17,000	1999	22,200	5.5%
Bernardston	I-91	North of Route 10	1995	13,000	1998	15,400	5.8%
Deerfield	I-91	1.8 Miles North of Route 116	1994	23,000	2000	32,168	5.8%
Deerfield	I-91	Whately Town Line	1994	19,000	1998	22,800	4.7%
Greenfield	I-91	Bernardston Town Line	1994	17,000	1999	22,200	5.5%
Greenfield	I-91	South of Leyden Rd Bridge	1995	22,000	1998	23,500	2.2%
Whately		Deerfield Town Line	1994	19,000	1998	22,800	4.7%
Whately	I-91	Hatfield Town Line	1995	24,000	1999	28,700	4.6%

\*Average Annual Daily Traffic.

Source: MassHighway and Franklin Regional Council of Governments.

Table 11 shows that all the sites along Interstate 91 with multiple years of data, experienced larger average daily traffic volumes during the late 1990s. For most of the locations, traffic grew at an average of 4-6 percent. This traffic growth results, at least in part, from increased development along the Hartford/Springfield to Brattleboro I-91 corridor, as well as greater levels of interstate and intercounty travel in the greater region. In addition, much of the travel along I-91 is through traffic that neither starts nor ends within Franklin County.

Along Route 2 (a principal arterial), most of the measured locations also faced higher traffic over the same timeframe (see Table 12). However, the rates of traffic volume increases were lower than along I-91, with the majority of sites having annual average growth in the 1-4 percent range. Additionally three locations experienced traffic declines of 1-5 percent. These sites were Route 2 at the Orange/Wendell town line, and Route 2 east of Zoar Rd and Route 2 west of East Oxbow Rd, both in Charlemont. The average AGR at the locations along Route 2 was 1.0 percent.

Table 13 displays traffic volumes and AGRs for sites along the county's minor arterial roadways. Multiple years of data were available for 11 locations. Seven of these locations experienced growth in traffic during the late 1990s, with the AGR for most being in the 2-3 percent range. The four sites with declines had traffic volumes drop by 0.5-5.2 percent annually. The average AGR at all the sites in the table was 0.8 percent.

**Table 12: Average Annual Growth in Traffic along Route 2**

Town	Route	Location	Past Year Count		Most Current Count		Avg Annual Growth Rate
			Year	AADT*	Year	AADT*	
Charlemont	Route 2	East of Zoar Rd	1994	3,100	2000	2,300	-4.9%
Charlemont	Route 2	West of East Oxbow Rd	1994	5,000	2000	4,700	-1.0%
Erving	Route 2	Gill Town Line	1994	7,600	2000	8,400	1.7%
Erving	Route 2	West of Mountain Rd	1994	7,400	2000	9,300	3.9%
Gill	Route 2	Erving Town Line	1994	7,600	2000	8,400	1.7%
Gill	Route 2	Greenfield/Gill Town Line	1994	12,200	2000	12,700	0.7%
Greenfield	Route 2	East of Route 5/10	1995	10,000	1999	11,300	3.1%
Orange	Route 2	Between Routes 122 & 202	1994	5,700	2000	7,500	4.7%
Orange	Route 2/202	Athol Town Line	1995	8,900	1998	9,500	2.2%
Shelburne	Route 2	West of Greenfield Town Line	1994	11,000	2000	11,600	0.9%
Wendell	Route 2	Orange/Wendell Town Line	1995	7,200	1998	6,700	-2.4%

\*Average Annual Daily Traffic.

Source: MassHighway and Franklin Regional Council of Governments.

The small average increases in traffic volumes shown in Table 12 and Table 13 reflect the fact that development in the region has slowed in recent years. The traffic trends also reflect that fact that while some areas are still experiencing growth, others have faced population and labor declines, so that overall changes in traffic volumes are small.

**Table 13: Average Annual Growth in Traffic on Various Minor Arterials**

Town	Route	Location	Past Year Count		Most Current Count		Avg Annual Growth Rate
			Year	AADT	Year	AADT	
Bernardston	Route 10	0.9 Miles East of I-91	1995	7,800	2000	8,576	1.9%
Colrain	Greenfield Rd	Shelburne Town Line	1994	2,100	2000	2,700	4.3%
Deerfield	Route 116	Sunderland Town Line	1995	15,000	2000	17,000	2.5%
Erving	Route 63	Montague Town Line	1994	4,300	1999	4,200	-0.5%
Greenfield	Route 2A	East of Elm St	1995	17,000	1998	14,500	-5.2%
Greenfield	Route 2A	East of High St	1994	12,000	2000	13,900	2.5%
Leverett	Route 63	Sunderland Town Line	1994	3,600	2000	3,500	-0.5%
Montague	Route 63	North of Gunn Rd	1994	3,400	2000	3,900	2.3%
Montague	Route 63	Sunderland/Montague Town Line	1994	3,100	2000	3,500	2.0%
Northfield	Route 63	Erving Town Line	1994	2,200	2000	1,940	-2.1%
Sunderland	Route 116	0.25 Miles East of Route 47	1994	11,000	2000	12,400	2.0%

Source: MassHighway and Franklin Regional Council of Governments.

Further, during the 1990s, total travel in Franklin County remained roughly constant, providing further evidence of the slowdown in development and growth. Between 1990 and 1997, Daily Vehicle Miles Traveled (DVMT) changed only slightly (drop of 0.4%). In both years, DVMT for Franklin County totaled approximately 3.3 million miles.

Traffic is largely not congested on the roads within Franklin County. The FRCOG continues to work with MassHighway to conduct traffic counts for roads throughout the region and to monitor traffic levels and growth. Franklin County towns are encouraged to contact the FRCOG to further discuss traffic counting in their communities or the region.

### Congested Intersections

Franklin County does not suffer from the severe congestion problems that are associated with many cities and larger towns in Massachusetts. Nonetheless, during peak travel periods, congestion is becoming a concern at a number of intersections within the county. Over the last five years, the FRCOG has begun conducting intersection analyses and has identified a number of intersections with congestion issues. The FRCOG has also been investigating new traffic signal technologies and other alternatives for intersection traffic control. The FRCOG currently employs the SIDRA (Signalized and Unsignalized Intersection Design and Research Aid) intersection analysis software, which allow for analysis of the full range of intersection types. This software also supports detailed input of intersection characteristics, thereby resulting in a more accurate analysis of existing and future conditions than was previously possible. Many of the FRCOG's intersection evaluations have been conducted as part of larger projects, such as corridor or local planning studies. Franklin County towns interested in having an intersection analysis performed in their community are encouraged to contact the FRCOG to learn more and to discuss funding options.

### **High Accident Locations**

The FRCOG collects and analyzes accident data for all communities in Franklin County to identify locations that have experienced a high occurrence of accidents in recent years. In 2000, the FRCOG completed an extensive evaluation of accident data for the 1995-1997 period. The first stage of the study involved reviewing Registry of Motor Vehicle (RMV) accident records for the given time period and assessing which accident locations in the county are the most hazardous based on RMV and traffic count data. In the second stage of the study, many of the high accident sites were investigated further to ascertain what factors might be contributing to large numbers of crashes at these locations.

Traffic accidents are often unpredictable and sometimes unavoidable occurrences. Accidents are often, at least in part, the result of driver error. Driver error can be compounded by structural deficiencies such as poor roadway or intersection design, or inadequate traffic control. When crashes occur on multiple occasions at a particular location, there can sometimes be a common reason that is related to the roadway design, layout, traffic control, or signage at that site.

The Registry of Motor Vehicles maintains a database of all reported accidents in Massachusetts, and this database was used extensively during the first part of the FRCOG study. This database contained records for over 4,500 accidents in Franklin County during the three-year study period of 1995-1997. The accident records were first sorted by town and then by specific location. Each location was then evaluated in terms of the severity of accidents that occurred there. The severity of each accident was assessed using the Equivalent Property Damage Only (EPDO) rating point system, which assigns one point to accidents that only involve property damage, five points to accidents that result in injury, and ten points to accidents that result in a fatality. This type of information is included in the RMV database. Each accident was given one EPDO value (1, 5, or 10). A cumulative EPDO rating for each location was then produced by summing the EPDO values of each accident that had occurred there.

One issue with using the EPDO rating system to determine a region's most hazardous accident locations is that EPDO ratings do not incorporate traffic volumes at accident sites. The level of traffic is a major factor in determining how hazardous a location is, since the higher traffic volume at the site, the greater the probability that an accident will occur there. To determine the most

hazardous accident locations, the FRCOG used a measure that incorporated both the EPDO values for each site and the Average Annual Daily Traffic (AADT) at that location.<sup>3</sup> This measure is described in MassHighway's *Highway Design Manual* (1997 edition) and as is referred to the EPDO rating for a Million Entering Vehicles (MEV<sub>EPDO</sub>).<sup>4</sup>

Table 14 displays the ranked list of the 30 most hazardous accident locations in Franklin County, based on the MEV<sub>EPDO</sub> calculations. The higher the MEV<sub>EPDO</sub> rating, the more hazardous a location. The 30 most hazardous locations are also shown on Map 3. All 30 locations are at intersections.

**Table 14: 30 Most Hazardous Accident Locations (Intersections) in Franklin County, 1995-1997**

Rank	Town	Intersection	Number of Accidents	Equiv. Property Damage Only Rating (EPDO)	Million Entering Vehicles (MEV) EPDO Rating
1	Greenfield	Davis St/Garfield St*	12	60	16.75
2	Greenfield	Conway St/Grove St*	10	34	8.82
3	Greenfield	I-91/Route 2/Route 2A Rotary*	71	190	5.81
4	Greenfield	Allen St/Conway St*	12	28	5.51
5	Greenfield	Allen St Wells St*	14	42	5.50
6	Gill	Main Rd/Route 2*	25	69	5.11
7	Greenfield	Church St/Franklin St	8	20	4.20
8	Orange	North/East/South/West Main Streets*	25	46	4.18
9	Greenfield	High St/Maple St	15	43	4.14
10	Greenfield	College Dr./Colrain Rd	8	24	3.74
11	Greenfield	Conway St/Devens St	6	18	3.54
12	Deerfield	Conway Rd (Route 116)/Route 5/10*	18	62	3.46
13	Greenfield	Davis St/Silver St	8	32	3.21
14	Orange	Lower Holtshire Rd/West River St*	8	18	2.92
15	Deerfield	River Rd (north)/Route 116*	15	47	2.80
16	Buckland	Route 2/State St*	4	16	2.52
17	Greenfield	Cheapside St/Hope St	6	18	2.41
18	Deerfield	Route 116/Sugarloaf St*	16	49	2.40
19	Greenfield	Elm St/Philips St	4	16	2.36
20	Orange	East Main St/Water St*	8	20	2.35
21	Deerfield	Elm St/Route 5/10*	12	40	2.27
22	Montague	L St/Third St*	6	18	2.20
23	Greenfield	French King Highway/Loomis Rd	9	25	2.18
24	Greenfield	Conway St/Main St	13	37	2.17
25	Greenfield	Bernardston Rd/Route 2	6	18	2.14
26	Sunderland	Route 116/Route 47*	17	42	2.09
27	Orange	East Main St/Mechanic St	4	16	2.00
28	Greenfield	Federal St/Silver St	16	46	1.95
29	Greenfield	Route 2/Colrain Rd/Robbins Rd	17	54	1.81
30	Whately	Interstate 91 Exit 24/Route 5/10	27	63	1.76

\* Intersections chosen for additional data collection and analysis (stage 2 of the study).

Source: Franklin Regional Council of Governments, *Identification of the Most Hazardous Intersections in Franklin County, July 2000*.

<sup>3</sup> AADTs for Franklin County roadways are listed in Appendix 3 and were discussed earlier in the Transportation section.

<sup>4</sup> The MEV<sub>EPDO</sub> for an intersection is calculated as (1,000,000 \* Total EPDO) / (AADT \* 365 \* T), where T is the time frame of the analysis in years. In the recent FRCOG hazardous accident locations study, T equaled 3.

**Map 3: 30 Most Hazardous Intersections in Franklin County, 1995-1997**



Seventeen of the most hazardous intersections are in Greenfield, the most heavily populated and traveled town in the region. The majority of these locations have multiple residential streets crossing each other or residential streets intersecting with major roadways. This could reflect the fact that as traffic volumes on major routes increase, drivers seek alternative routes that sometimes include residential streets. These residential streets are often inadequate to accommodate the higher volumes of traffic, and therefore, as volumes on these streets increase, accidents on them do as well.

According to the MEV<sub>EPDO</sub> ratings, the most hazardous accident location in Franklin County is in Greenfield at the intersection of Davis and Garfield Streets, two residential streets. At the time of the FRCOG study, the Town of Greenfield had already independently recognized that this was a hazardous intersection and had implemented mitigation measures to reduce accidents at this site.

In the second phase of the FRCOG study, sixteen of the thirty most hazardous intersections (listed in Table 14) were selected for further analysis. These intersections are indicated in Table 14 with an asterisk. During the study's second stage, FRCOG staff visited each of the relevant local Police Departments, and State Police barracks in Shelburne and Athol to collect additional information about the sixteen accident locations. This information included 1998 accident data that were available at the local Police Departments. From the additional collected information, collision diagrams were created for the sixteen intersections. A collision diagram is a schematic, not-to-scale, graphical representation of the accident patterns at a particular location. Brief half-page to one-page assessments were written up for each of the sixteen locations as well. These assessments detailed each intersection's roadway, signalization, traffic volume, and accident characteristics.

The FRCOG's report *Identification of the Most Hazardous Intersections in Franklin County* summarizes the initial analysis that resulted in the list of the thirty most hazardous intersections. It also includes the collision diagrams and written assessments for the sixteen intersections evaluated further in the second part of the study.

Since the study was completed, many of the thirty most hazardous intersections have been studied by the towns or state agencies for potential mitigation measures, and in some cases, mitigation measures have already been implemented. The FRCOG recently finished its own in-depth evaluation of one of the cited locations, the intersection of Route 116 and River Road in Deerfield, and proposed a number of potential corrective measures. The FRCOG has also further analyzed some of the other identified hazardous intersections further as part of other transportation and planning projects.

### **Alternative Design Guidelines to Retain Rural Character**

The Franklin Regional Council of Governments advocates for the development and use of alternative design and construction standards for roads and bridges in order to protect the rural character of Franklin County. The AASHTO (American Association of State Highway and Transportation Officials) standards for roadway design were established primarily to promote motorists' safety. They were also designed for use principally in urban and suburban areas. As a result, applying the AASHTO design standards for all roadways in Franklin County, a mainly rural area, can be excessively restrictive and more than is necessary given the traffic volumes, speeds, and vehicle types on most roads in the county. Further, using AASTHO standards for rural road projects can make the projects both more expensive and aesthetically inappropriate for their surroundings. The FRCOG and many of the county's municipalities are committed to designing roadways that are safe, but that also preserve the rural character of the region.

In 1995, the FRCOG produced *Design Alternatives for Rural Roads*, a reference guide that outlines alternatives to the traditional AASHTO guidelines for road and shoulder widths and materials, guardrails, retaining walls, and lighting. The manual provides descriptions of alternative designs and gives examples of places where different alternatives have been used. The manual is currently out of print and in the process of being updated and expanded. The update will be available by the end of 2001.

In 1997, MassHighway issued alternative standards for low traffic volume, low speed roadways. These standards establish distinct guidelines for construction projects on rural roads, in recognition of the fact that the AASHTO guidelines may not be appropriate in rural areas. The Low Speed, Low Volume (LSLV) Standards were established to help maintain the unique character of rural roads when the roads face major construction projects. The standards allow road and shoulder widths for these projects to be narrower than is acceptable under the normal guidelines, and they eliminate the need to apply for a design exception in order to use the reduced widths. Roadways must meet the following three criteria to be eligible for the alternative low speed, low volume standards:

1. Roadway must be functional classified as a local road, or a minor or major collector.
2. Roadway must have design year speed traffic volumes of no more than 2,000 vehicles per day. The design year is 5 years out for resurfacing projects, 10 years out for rehabilitation projects, and 20 years out for reconstruction projects.
3. Roadway must have road-operating speeds of 40 miles per hour or less. Generally, the operating speed is the posted speed.

Appendix 4 contains more details on the Low Speed, Low Volume Design Standards. It excerpts Section 8.2 of the 1997 MassHighway Design Manual describing these alternative standards. It also contains tables giving the minimum widths that the standards require for travel lanes, shoulders, offset areas, and bike lanes, depending on a roadway's average daily traffic volumes and typical operating speeds. The MassHighway Design Manual contained only metric measurements. However, for convenience, Appendix 4 includes a version of the minimum roadway width table that uses English units. The appendix also contains a brief explanation of the terms in the tables, based on the FRCOG's interpretation. Individuals and communities interested in initiating the low speed, low volume standards for road projects in their areas should contact their MassHighway District office. Please see Appendix I for contact information.