



Department of Transportation



2017 Tri-State Performance Measures

2017 Annual Report

Transportation Performance







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Executive summary:

In August 1997, discussions began between Vermont, New Hampshire, and Maine, hereafter referred to as Cooperating States or Tri-State, regarding intelligent transportation systems (ITS). The outcome of a meeting on March 26, 2002 was the first Tri-State Operations Coalition Meeting where several maintenance and operation personnel from each state gathered for an all-day meeting on a variety of topics. VTrans' Director of Maintenance, David Dill, reported to VTrans leadership that the meeting was...

"Very productive. All agree that sharing resources and knowledge on a regional basis is becoming more and more important, not only because of our common financial constraints, but also to make the most of emerging technology. Our intent is to expand our cooperative efforts, and we will now meet once per quarter."

By 2005, the Tri-State meetings had branched out to include a project delivery focus resulting in each state's Chief Engineer and Project Delivery teams meeting on the same day as their Operations counterparts at the quarterly meetings. Federal Highway Administration (FHWA) was also invited to attend.

As early as 2009, Tri-State recognized that performance standards were being discussed on a national scale by the United States Congress (Congress) and the American Association of State Highway and Transportation Officials (AASHTO), for incorporation into future Transportation Bills, and by FHWA for incorporation into respective stewardship agreements. It was also recognized that standard performance measures would benefit each State by assisting in communications with their respective stakeholders and customers. For these reasons Maine, New Hampshire and Vermont entered into a Memorandum of Understanding (MOU) in the fall of 2010, and amended on October 26, 2016 (Appendix A), agreeing to work together to develop standard performance measures relating to asset conditions, business processes, and safety.

In 2012, the President of the United States signed the federal transportation bill entitled Moving Ahead for Progress in the 21st Century (MAP-21). In 2015 the President signed into law the Fixing America's Surface Transportation Act, or "FAST Act" - The FAST Act authorizes \$305 billion over fiscal years 2016 through 2020 for highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, research, and technology and statistics programs. With its enactment, State and local governments may now move forward with critical transportation projects designed to strengthen and reinforce our infrastructure. The Tri-State work to date has focused on utilizing standard measures to monitor performance. The close and collaborative monitoring of these measures has identified areas for improvement, which have been highlighted in a number of national domains as examples of how the MAP-21 language can work. FHWA released its Final Rulemaking determination on Asset Management



Plans and Processes in Oct. 2016. This Final Rule making also includes requirements for National Performance Management Measures. The efforts of Tri-State have the three States well positioned to establish performance measures and targets as well as asset management processes to meet the requirements of the federal law as it comes into full effect.

A thank you goes out to our stakeholders and customers in reporting, sharing, and recognizing the importance of these performance measures. The value of this report is realizing lessons learned and best practices that will reinforce our successes along the way.







Tri-State Quick Facts

The table below shows each State's "tale of the tape" as a snapshot of assets and maintenance efforts involved in its management.

Tri-State Transportation Quick Facts 2017						
	Vermont	New Hampshire	Maine			
Miles of Local and State Roadway (Public Roads)	14,174	16,619	23,419			
Miles of Agency-Managed National and State Highway System	3,515	4,598	8,812			
Miles of National Highway System	806	1,480	1,875			
Miles of State Highway System	2,709	4,906	9,074			
2017 Highway Fatalities	68	102	172			
Inventoried Local and State Long Bridges (Over 20 feet long)	2,739	2,409	2,417			
Inventoried Long Bridges (State Owned/Maintained)	1,090	1,468	2,183			
Dump Trucks with Plows and Wings	274	324	400			
Licensed CDL Drivers (employed by the State)	374	827	975			
Hours of Plowing Winter 2016-2017	280,000	411,963	316,216			
Miles of State-Owned Operating Rail	305	202	334			
Miles of Privately-Owned Rail	295	242	804			
Public-use Airports	16	25 (2 owned by Pease)	193 (6 State- owned)			
Runway Miles	90	24	169			
Increase in Public Transit Ridership Reported 2013-2017	-2.20%	-0.05%	17.00%			
State-owned/Maintained Park and Ride Facilities	30	27	33			
Park and Ride Parking Spaces	1,525	6,124	3,310			
State Funded Municipal Park and Ride Facilities	66	0	14 municipals, 7 private			
Park and Ride Facilities w/ EV 1 charging	6	0	0			
Traffic Signals	157	439	803			
Roadway Lights	1,100	3,067	1,898			
Cost of trash collected (in millions)	\$1.40	\$0.529	\$0.28			







Tri-State Business Performance Measures

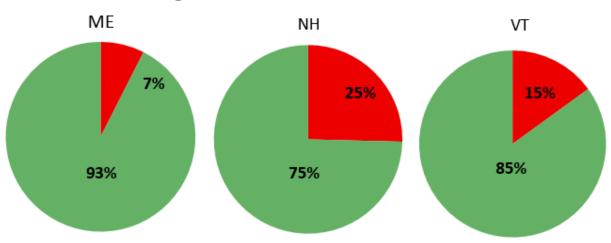
As agents of State government, the most important asset we can build and maintain is the trust of the people we serve. Trust in our agencies not only makes projects go easier, it makes legislative and executive funding decisions a more straightforward process. When the public and our partners in industry believe in our ability to deliver on promises, they become stronger advocates for our agencies' goals, plans, and budgets.

That trust is built by *consistently* doing three simple things: say what we intend to do, do it, and when necessary, clearly explain why something was not done as expected. In the realm of capital project development, it begins and ends with schedules, budgets, and the quality of our final products.

In the fall of 2010, representatives of Maine DOT, New Hampshire DOT, and Vermont AOT agreed to begin tracking some common performance measures in the area of operations and capital project production.

Percent on Time Delivery

Since 2009, Maine DOT has been measuring and reporting on the quality of its project schedules, and their process was used as a framework for the first of the Tri-State measures, Percent on Time Delivery. The basis for measurement is a calendar year Construction Advertisement Plan (CAP), published at or before the first of the year. The CAP includes all projects developed for advertisement by each agency's in-house staff. Because it extends across an entire year, the standard for "On Time" is advertisement within 30 days of the CAP date. On Time reports are issued quarterly. The green portion of the pie charts seen below represents the On-Time percentage, by number of projects, at the time of the report. The schedule status for the remainder of the year (zeroes on this 4th Quarter example), and the projected year-end results are contained in the table beneath the pie charts.



Percentage Advertised On Time: 2017 Qtr 4 Results







State	On Time	Delayed or Removed	% On Time
ME	223	18	93%
NH	47	16	75%
VT	68	12	85%

Total Delivery

The second measure reflects two aspects of program management: The accuracy of cost estimates in the original CAP (previously described), and the volume of work added to project delivery programs in an ad hoc manner. At the time of reporting, this measure compares the construction value advertised-to-date plus the construction value for projects added to the schedule after CAP publication, with the originally estimated value of the projects included in the CAP. Construction value refers only to the actual or estimated contract award amount for each project. It does not include preliminary engineering (PE), construction engineering (CE), or right-of-way costs. The percent of CAP is the comparison of the original CAP to the construction value of the CAP.

State	Advertised to Date	Construction Value of CAP	Percent of CAP				
ME	\$296.34	\$311.95	95%				
NH	\$181.35	\$179.81	101%				
VT	\$184.96	\$216.95	85%				

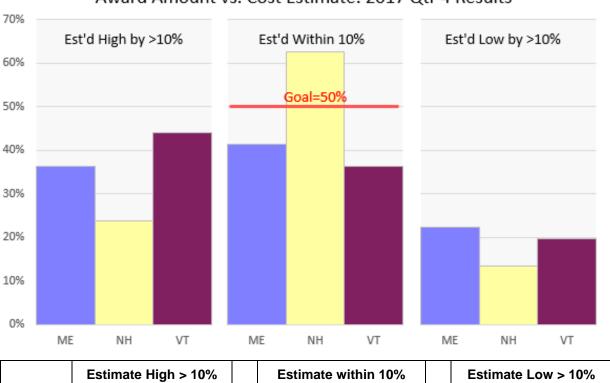
Total Construction Value Delivered 2017 Qtr. 4 Results (In Millions)

Estimate vs. Award

This measure is an assessment of the Tri-States' ability to anticipate construction costs accurately. Accurate cost estimates allow States to plan work efficiently and fully utilize available resources. The goal for this measure is to have at least 50% of each State's project estimates be within 10% of the low bid at the time of letting.

At each quarter, it reflects the results for all projects awarded up to that time. Unlike the first two measures, this one is not tied directly to the CAP. At each quarter, it will reflect the results for the year-to-date.





Award Amount vs. Cost Estimate: 2017 Qtr 4 Results

	Estimate High > 10%		Estimate within 10%			Estimate Low > 10%				
State	ME	NH	VT	ME	NH	VT		ME	NH	VT
Projects	83	16	29	95	42	24		51	9	13
%	36	24	44	41	63	36		22	13	20

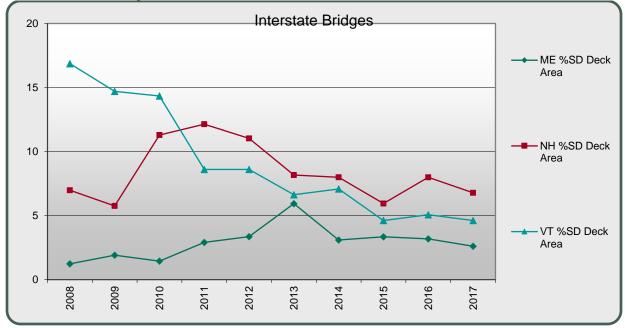
Tri-State Bridge Condition Performance Measures

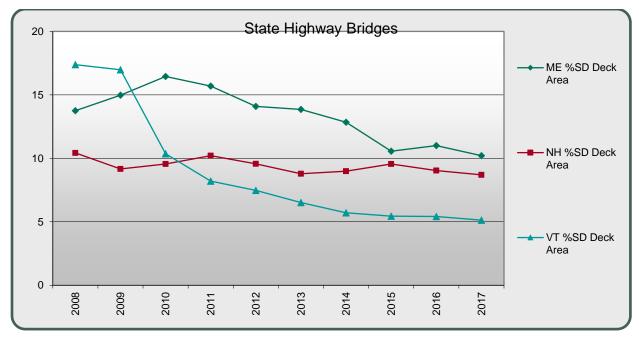
Historically the "health" of the national network of bridges has been measured and compared amongst states utilizing structural deficiency; both as the number of structurally deficient bridges and as a percentage of total bridge population. The performance measures that Tri-State uses are:

- % Structurally Deficient (SD) by Deck Area
- Needs based categories aligned with the NBI bridge condition ratings

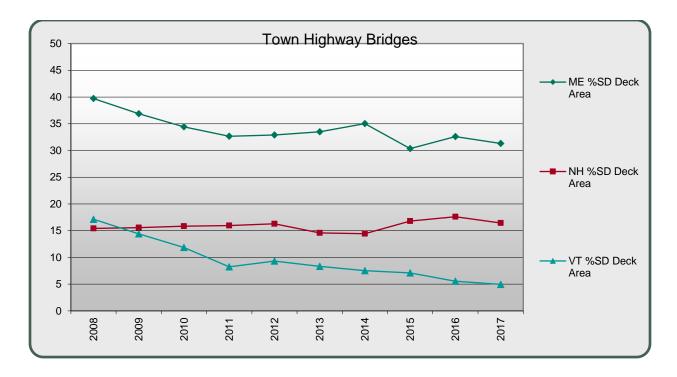


Percent Structurally Deficient Deck Area









Tri-State Bridge Performance Measure

AASHTO's Subcommittee on Bridges and Structures (SCOBS) task force is in general concurrence with AASHTO's Subcommittee on Performance Measures (SCOPM) with the following refinements and modifications:

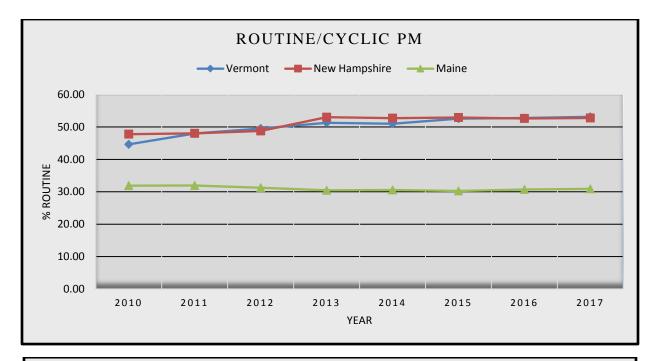
"The second measure should reinforce an asset management approach and show bridge preservation and replacement needs. Instead of using the terms Good, Fair, and Poor, the task force recommends the following work category descriptors: Cyclic Maintenance (CM), Preventative Maintenance (PM), and Rehabilitation and Replacement (R&R)."

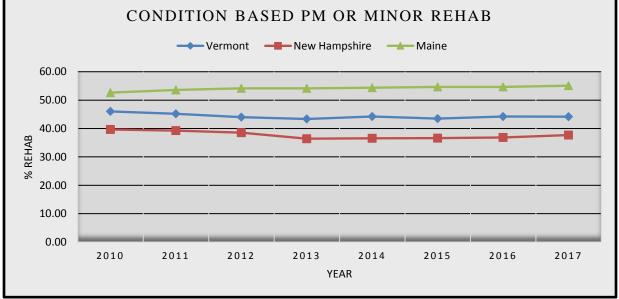
The following needs-based categories are aligned with the NBI bridge condition ratings. These categories are indicated as;

- Cyclic Maintenance Needs (includes routine maintenance) = NBI 7-9.
- Preventative Maintenance Needs (includes minor rehab) = NBI 5-6.
- Replacement or Rehab Needs (includes major rehab) = NBI 0-4

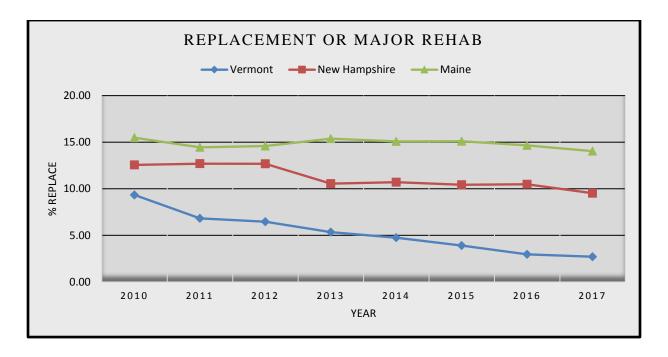


Tri-State Bridge Performance Measure









Tri-State Pavement Condition Performance Measure

It has been recognized that each of the Cooperating States has been collecting International Roughness Index (IRI) data on their respective highway networks for a number of years following established standards and protocols as part of their Highway Performance Management System (HPMS) submittals. This protocol includes the IRI data taken while driving over both bridges and railroad crossings. This condition measure was chosen for comparing the relative health of pavement surfaces as well as an implicit measurement of the effectiveness of each Cooperating State's pavement management strategies. To further characterize and compare the condition of their respective highway networks, IRI data has been compiled by functional classification. The IRI data is used to identify how each of the highway types compares and illustrate where similarities may lie in the manner with which the Cooperating States prioritize the allocation of transportation funds.

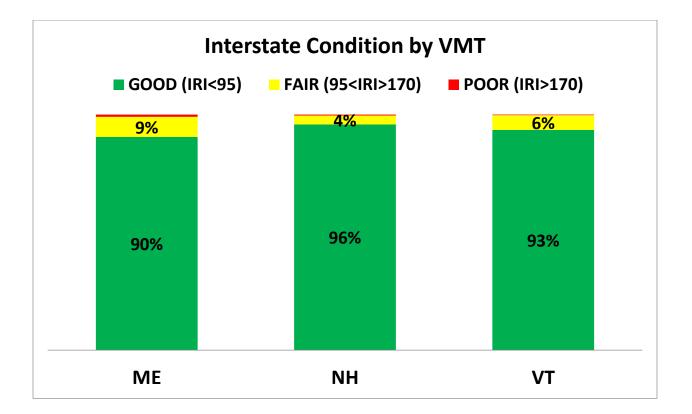
Condition states were also assigned by establishing numeric thresholds for the IRI results equating to a Good, Fair, and Poor designation. Recognizing that higher type facilities such as interstates and other principal arterials such as functional class 1 and 2 typically host higher travel speeds and larger traffic volumes a more rigorous breakpoint between Fair and Poor was utilized for the IRI as compared to all other facility types. The premise was that roughness would be perceived as less objectionable on lower speed facilities. These separate and distinct thresholds were established based on FHWA recommendations, as well as other references, both of which are essentially recognized at the national level as being practical from a user perspective. Additionally, to evaluate how each Cooperating State manages their highway networks with respect to customer usage, IRI data was further categorized in a separate analysis by weighting the various roadway segments by Vehicle-Miles Traveled (VMT). This approach is



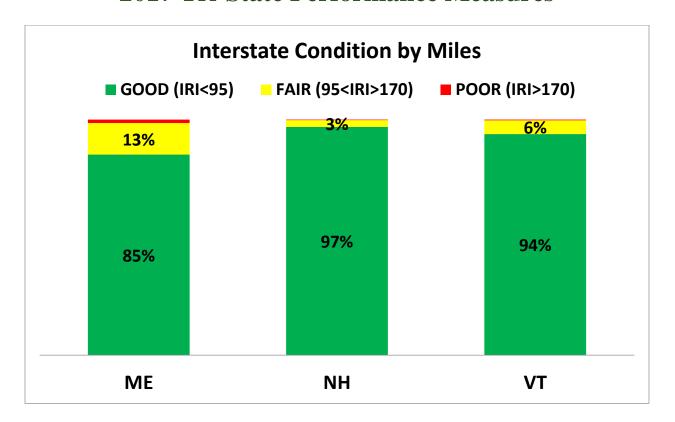
meant to illustrate and emphasize the health of the Tri-Sate network, as experienced by the greatest number of users.

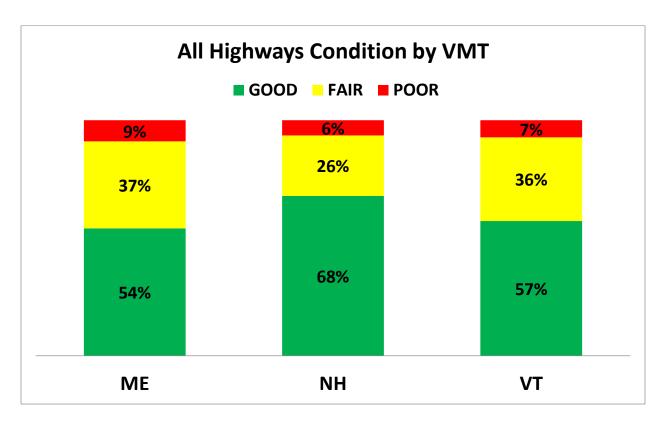
Functional	System	Good	Fair	Poor
1	Interstate	IRI < 95	IRI ≥ 95 and ≤ 170	IRI > 170
2	Other Freeways and Expressways	IRI < 95	IRI ≥ 95 and ≤ 170	IRI > 170
3	Other Principal Arterial	IRI < 95	IRI ≥ 95 and ≤ 220	IRI > 220
4	Minor Arterial	IRI < 95	IRI ≥ 95 and ≤ 220	IRI > 220
5	Major Collector	IRI < 95	IRI ≥ 95 and ≤ 220	IRI > 220
6	Minor Collector	IRI < 95	IRI ≥ 95 and ≤ 220	IRI > 220
7	Local	IRI < 95	IRI ≥ 95 and ≤ 220	IRI > 220

The tables and charts on the following pages show that each Cooperating State trends toward maintaining their higher functional class facilities at a higher level of service in terms of smoothness as compared to the remainder of their network.

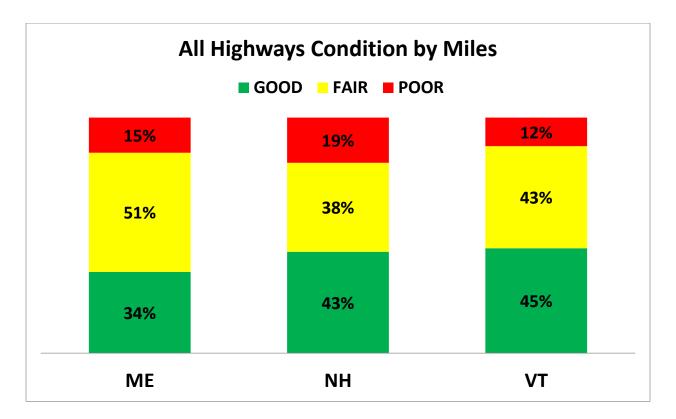












Sign Performance Measure

Maine, Vermont, and New Hampshire share a common goal of having a sign performance measure that will provide a benchmark on the overall sign system. This performance measure will allow the three states a common reference point from which to view their systems and will aid in the continued cooperative sharing of information among the three states.

In 2010 the three states worked together to develop the current sign performance measure recognizing that each state has different degrees of data granularity available. As a starting point, the different sign management systems were discussed and summarized by systematically stepping through the pros and cons of various possible measures while keeping in mind what data was available and feasible for each state. The result of these efforts established the choice of "Percent of Non-Interstate Signs Above Service Life" as the most appropriate performance measure.

Percent of Non-Interstate Signs Above Service Life is an indicator of those signs that are still functioning as intended and are providing adequate guidance to the traveling public. These signs have not unduly deteriorated due to various factors such as age, loss of retroreflectivity, or damage. The table below gives a snap shot of what the current percentage looks like for each state as well as the management method currently being used to make that determination.





Existing % Signs Above Service Life.						
State	Current % Signs Above Service Life	Method				
New Hampshire	89%	Night Time Visual				
Vermont	83%*	Sign Age				
Maine	85%	Sign Age				

Existing % Signs Above Service Life.

* The VTrans sign database is undergoing a statewide reconciliation and as such the current % above service life will not be rerun until the reconciliation is completed.

Vermont Sign Summary

The Vermont Agency of Transportation (VTrans) is responsible for approximately 64,000 active traffic signs statewide along 2,704 miles of state owned highway system. This is comprised of 703 miles of National Highway System, 320 of which is Interstate miles.

The management of this system is accomplished by the combined efforts of the Project Delivery Bureau (PDB), the Asset Management and Performance Bureau (AMP), and the Maintenance and Operations Bureau (MOB) Signs are installed through construction projects and by MOB work orders.

VTrans has managed signs since 1996 using a proprietary software. The inventory tracks over 30 sign attributes such as location information, age, MUTCD/state code, support information, and work history. This information is used in support of VTrans' retroreflectivity management method, sign plaque age, which uses a 15-year useful life.

In 2017, VTrans programed or constructed over 228 miles of sign projects and continued its statewide sign data project.

New Hampshire Sign Summary

The New Hampshire Department of Transportation (NHDOT) is responsible for maintaining approximately 51,342 traffic signs statewide along 4,606 miles of state owned highway system. This includes 1,480 National Highway System (NHS) miles and 845 Interstate/Turnpike and other limited access divided highway miles.

The management of the sign system is accomplished through the Bureau of Traffic. Both individual sign replacements due to age and damage, and program sign replacement using State and Federal funds, are managed out of the Traffic Bureau.

NHDOT is still in the early stages of collecting sign inventory data and uses the MATS asset management module to keep track of sign work accomplishments. Until this inventory is complete we will use data collected to date and extrapolate to obtain a statewide estimate of total signs maintained.

In 2017 the Bureau of Traffic sign crews repaired or replaced a total of 9,908 damaged or deficient signs and installed 408 new signs. This does not reflect the number of signs which have been replaced through construction projects.

A night time review of sign reflectivity was conducted over 1,117 miles identifying 1,427 reflectivity deficient signs for a rate of 1.28 signs per mile. Expanding this rate to the entire highway system equates to an estimated total of 5,884 reflectivity deficient signs statewide or







11% of the sign inventory. In 2016 this percentage was reported to be 21% of the total sign inventory.

Maine Sign Summary

The Maine Department of Transportation (MaineDOT) is responsible for traffic signs statewide along 8,800 miles of state-owned highway. The system includes 1,330 miles of National Highway System, 367 miles of which is interstate. To date Maine DOT has inventoried roughly 20,000 signs and it is estimated that there are approximately 80,000 "Minor Signs" under state responsibility ("Minor Signs" include the typical signs that are normally u-channel or wood post mounted). The inventory of the state's Minor Signs has been a topic of frequent discussion but we have yet to identify an efficient and manageable system for maintaining such an inventory beyond its initial collection. Therefore, as of this writing, we continue to investigate potential options before investing the significant resources that will be required for this effort. On the interstate system, there are 2,260 "Major Signs" (those constructed from extruded panels or involving more specialized supports), in addition to another 131 Major Signs located off of the interstate system. During 2018, MaineDOT will advertise a contract to undergo a Curve Sign/Advisory Speed determination and placement effort.

Sign management is the responsibility of the Traffic Engineering Division in the Bureau of Maintenance and Operations (M&O). The majority of MaineDOT's sign replacements are performed by the M&O crews located throughout the state. MaineDOT is approximately 85% compliant on regulatory and warning signs statewide, due to a relatively recent statewide effort to replace and upgrade signs of this type. Maine DOT has also brought most of its guide signs into compliance and added mileages to all destinations. At this point, MaineDOT is approximately 75% compliant on statewide guide sign retro reflectivity and an interstate sign replacement effort has begun. MaineDOT is approximately 60% compliant in this regard and over the next ten years plans to bring the rest of its inventory into compliance using both M&O and contracted personnel.

Tri-State Safety Performance Measure

The Tri-State partners recognize that highway safety is not the responsibility of any one group or agency but is the combined responsibility of many agencies and departments. As such, each state has a Strategic Highway Safety Plan (SHSP), developed with the input from state and federal agencies, municipalities, industry, and the business community, that puts forth those critical emphasis areas (CEA) that would offer the greatest potential for reducing major crashes in their state. In the broader context of safety, the SHSP is meant to be implemented in conjunction with other state safety plans. An overview of each state's SHSP with corresponding emphasis was done in 2011. It was found that although each state has CEAs that are unique to that state, we do share six CEAs. These are Speed, Safety Belts, Young Drivers, Impaired Drivers, Distracted Drivers, and Intersections.

With the SHSP plans in mind, the Safety Performance Measure Working Group sought a performance measure that would complement these efforts. To this end, the group chose the national vision of Toward Zero Deaths with a corresponding performance measure of reducing



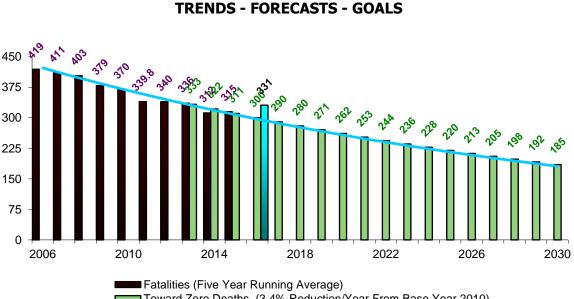




the fatality five-year rolling average by 50% by the year 2030. While Towards Zero Deaths is tracking the actual number of deaths it was thought that a measure that takes vehicle-miles traveled into account would help normalize the metrics to a common reference and provide a comparative picture of safety on our highways. To this end, the fatality rate per one hundred million vehicle-miles traveled and fatal plus incapacitating injuries per one hundred million vehicle miles was selected to report.

Toward Zero Deaths is a national strategy sponsored and supported by FHWA and AASHTO that focuses on using data-driven processes to identify and create opportunities for changing the highway safety culture. This strategy recognizes that with over 35,000 fatalities occurring on our Nation's highways each year highway safety remains a challenge for all of us and is depicted in the following graphs.

> **TRI - STATE TRAFFIC SAFETY PERFORMANCE MEASURES MAINE - NEW HAMPSHIRE - VERMONT**

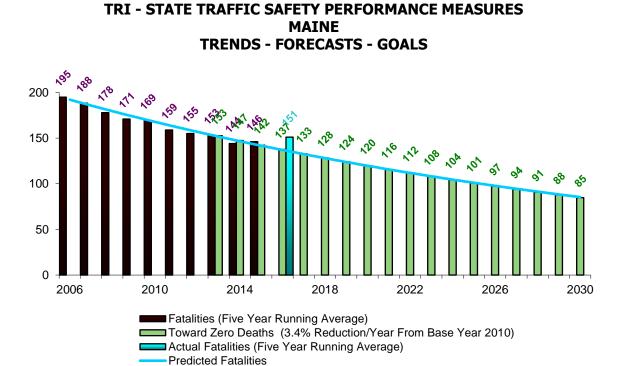


■ Toward Zero Deaths (3.4% Reduction/Year From Base Year 2010)

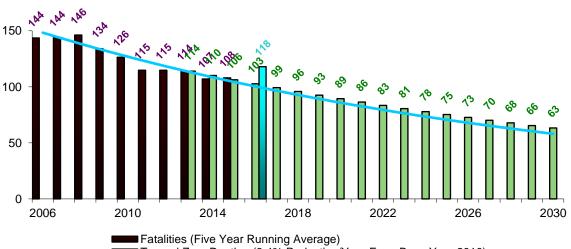
Actual Fatalities (Five Year Running Average)

Predicted Fatalities





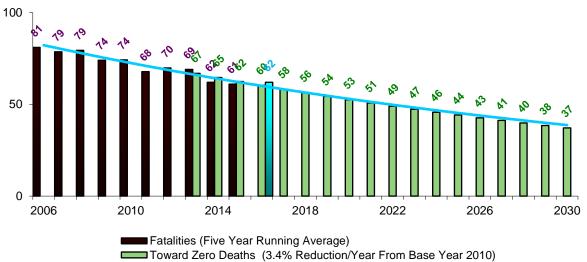
TRI - STATE TRAFFIC SAFETY PERFORMANCE MEASURES NEW HAMPSHIRE TRENDS - FORECASTS - GOALS



Toward Zero Deaths (3.4% Reduction/Year From Base Year 2010) Actual Fatalities (Five Year Running Average) Predicted Fatalities



TRI - STATE TRAFFIC SAFETY PERFORMANCE MEASURES VERMONT TRENDS - FORECASTS - GOALS



Actual Fatalities (Five Year Running Average)

Predicted Fatalities







New					
Hampshire					
Year	Fatalities (K - Severity)	HMVM	Fatality Rate (per/HMVMT)	Incapacitating (A - Severity)	K+A Severity Rate
2012	108	128.94	0.84	623	5.67
2013	135	129.03	1.05	489	4.84
2014	95	129.7	0.73	451	4.21
2015	114	130.94	0.87	459	4.38
2016	136	134.76	1.01	477	4.55
(5 YR Totals)	588	653.37		2499	
5 YEAR AVG	117.6	130.67	0.90	499.8	4.73
Maine					
Year	Fatalities (K - Severity)	HMVM	Fatality Rate (per/HMVMT)	Incapacitating (A - Severity)	K+A Severity Rate
2012	164	143.7	1.14	982	7.97
2013	145	143.98	1.01	865	7.01
2014	131	145.23	0.90	814	6.51
2015	156	148.29	1.05	754	6.14
2016	160	149.85	1.07	746	6.05
(5 YR Totals)	756	731.05		4161	
5 YEAR AVG	151.2	146.21	1.03	832.2	6.74
Vermont					
Year	Fatalities (K - Severity)	HMVM	Fatality Rate (per/HMVMT)	Incapacitating (A - Severity)	K+A Severity Rate
2012	77	71.96	1.07	311	5.39
2013	70	71.18	0.98	308	5.31
2014	44	71.74	0.61	288	4.63
2015	57	70.59	0.81	296	5.00
2016	62	72.09	0.86	322	5.33
(5 YR Totals)	310	357.56		1525	
5 YEAR AVG	62	71.51	0.87	305	5.13
Tri-State					
	Fatalities (K -		Fatality Rate	Incapacitating (A -	K+A Severity
Year	Severity)	HMVM	(per/HMVMT)	Severity)	Rate
2012	349	344.6	1.01	1916	6.57
2013	350	344.19	1.02	1662	5.85
2014	270	346.67	0.78	1553	5.26
2015	327	349.82	0.93	1509	5.25
2016	358	356.7	1.00	1545	5.34
(5 YR Totals) 5 YEAR AVG	1654 330.8	1741.98 348.40	0.95	8185 1637	5.65

Fatality Rate and F+I Rate







APPENDIX A: Tri-State Memorandum Of Understanding

TRI STATE AGREEMENT FOR STANDARDIZED PERFORMÀNCE MEASURES MEMORANDUM OF UNDERSTANDING II

This Memorandum of Understanding (hereinafter "MOU") is made this <u>26</u>th day of <u>3ct</u>, 2016 by and among the States of Vermont, Maine, and New Hampshire (hereinafter "the Cooperating States").

WHEREAS the Cooperating States executed the first Tri State Agreement for Standardized Performance Mensures Memorandum of Understanding on August 19th, 2010; and

WHEREAS the Cooperating States have realized solid benefits by shoring success stories and lessons learned from the measures; and

WHEREAS the Tri State standardized performance measures process of monitoring and emparing has been recognized by American Association of State Highway and Transportation Officials, as well as the Federal Highway Administration, as an exemplary model of performance and asset management; and

WHERKAS national performance standards have been adopted by the United States Congress in the MAP-21 Transportation Bill and further adopted in the FAST ACT; and

WHEREAS standardized performance measures among the Cooperating States have assisted in communications with respective stakeholders and legisladive bodies; and

WHEREAS the Cooperating States have similarly-sized departments, programs, and transportation systems; and

WHEREAS there is value in limiting this MOU to these three Cooperating States (a altaw for in-depth discussions similar to other Tri State agenda itoms.

NOW THEREFORE BE IT UNDERSTOOD THAT the Cooperating States piedge to work cooperatively to further develop stordardized performance measures for assets and business processes.

BE IT FURTHER UNDERSTOOD THAT the Cooperating States will continue to limit the formal agreement and anomal report to the three Cooperating States, although they will continue to share the concepts and results with other states.

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DE IT FURTHER UNDERSTOOD THAT Vermont will be the load in producing the annual report, and New Han:pshire and Maine will provide staff and resources in support.