

SOUTHWEST NH TRANSPORTATION ADVISORY COMMITTEE

NH 9 East Corridor

March 2, 2015

- This marks the first in a series of discussions we plan to hold on Corridors identified in *Southwest Connects*, the new Long Range Transportation Plan for Southwest New Hampshire. The first meeting will feature the NH 9 East Corridor.
- As part of this series SWRPC staff has reached out to municipalities that are part of the Corridor by inviting municipal elected officials and municipal staff, as well as State legislators representing communities that are part of the Corridor.
- The purpose of the Corridor meetings is to familiarize the TAC with each corridor as well as get feedback from local officials and municipal staff about the priority challenges and opportunities of each Corridor, in order to inform future transportation project programming and planning initiatives.
- Officials that are able to come to the meeting can participate in the conversation directly with SWRPC staff and TAC. We know that many people have busy schedules and most people are not able to attend our meetings. In an effort to reach people that are not able to attend, SWRPC will send the presentation, any handouts and meeting minutes to those officials and staff.
- We will also provide municipal and state officials SWRPC staff contact information so that they may follow up with comments and questions regarding the materials sent to them.

Presentation Outline

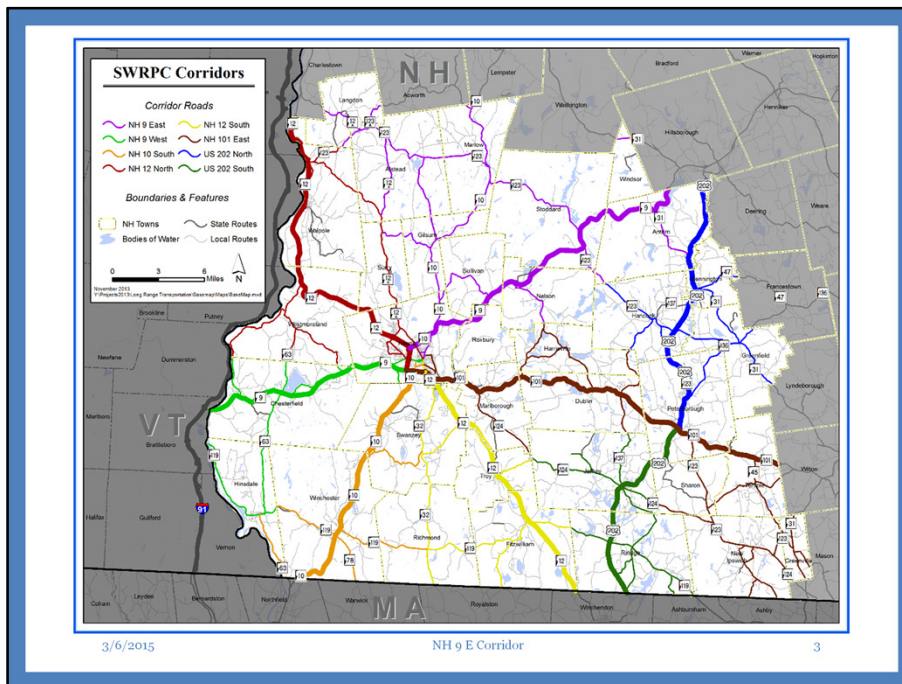
- Corridor Features and Location
- Population
- Travel & Vehicle Trends
- Commuting & Economy
- Housing & Land Use
- Performance Measures
- Challenges & Opportunities
- Past & Future Projects

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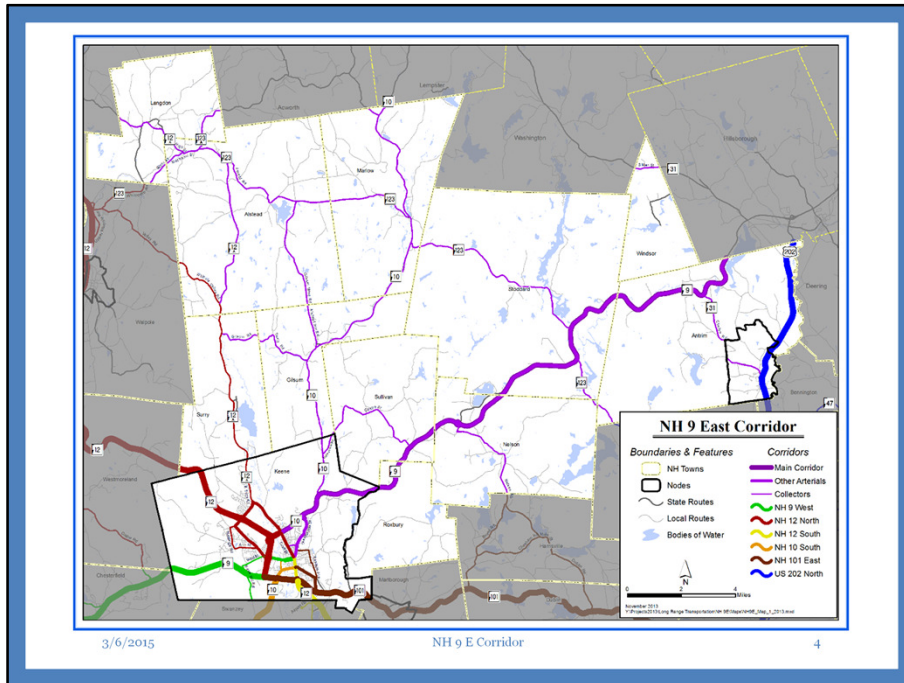
NH 9 E Corridor

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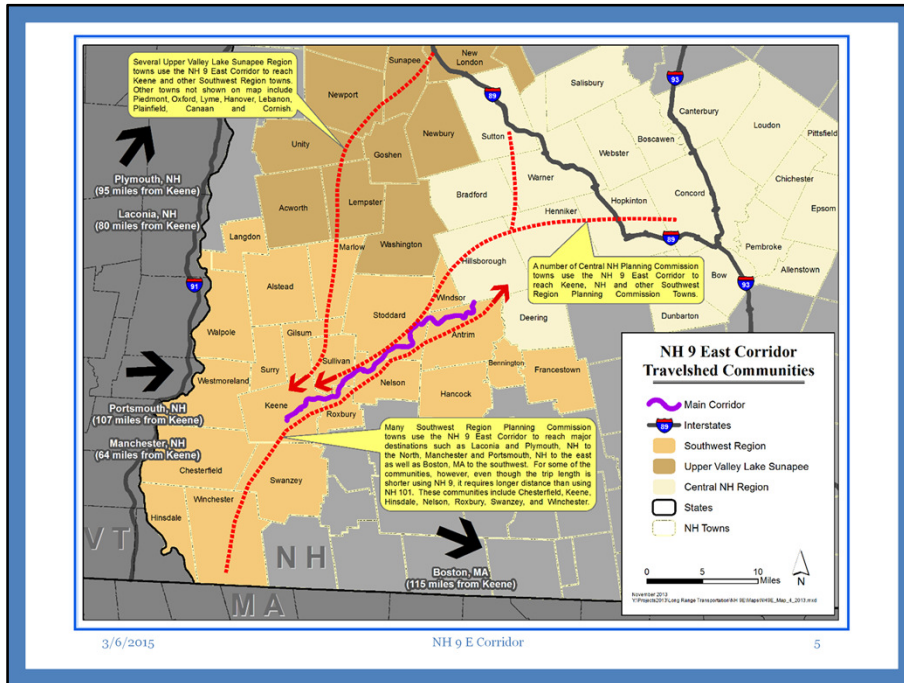
- Today's presentation will begin with an orientation and description of the NH 9 East Corridor including characteristics of the people that live there, how people travel along the corridor, economic characteristics of the corridor, and a description of housing activity and land use in the corridor system.
- NHDOT and USDOT are in the process of adopting performance measures for the transportation system in an effort to better connect funding allocation with state and federal goals. We will talk about these performance measures in the context of the Corridor.
- This presentation will cover the major challenges and opportunities for the Corridor as expressed in *Southwest Connects*.
- Then we will present past and future transportation projects and planning initiatives associated with the Corridor.
- We have set aside approximately 45 minutes to go through the presentation. I encourage that questions and comments be made along the way as long as we work together to complete our discussion by 3 pm.
- As we go through this presentation, I have created a handout of *Southwest Connects* Goals and Objectives. Feel free to refer to them as we begin our discussion about the NH 9 East Corridor.



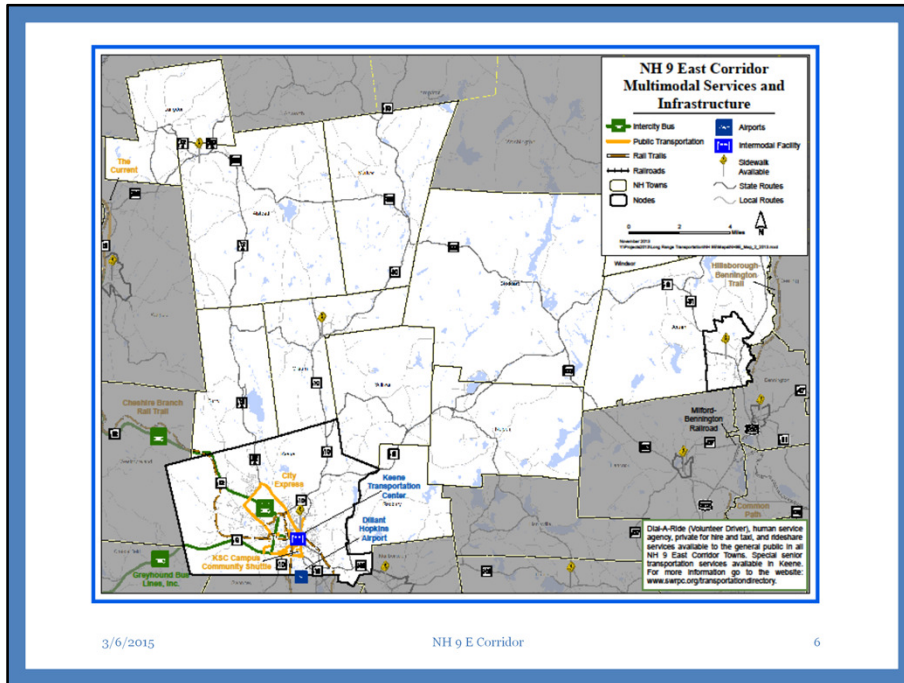
- This is a map of Southwest NH showing the eight corridors that were identified in *Southwest Connects*, each Corridor represented by a different color.
- Corridors are based on data SWRPC collected recognizing direction of travel patterns, traffic volumes, federal highway classifications (federally recognized arterials and collectors) and connections between major origins and destinations inside and outside of the Southwest Region.
- Since highway travel is by far the predominant mode of transportation Corridors are represented with what the Plan calls backbone arterials as well as collector roads that link to the arterial roads. While the highway system is the central framework of each Corridor, the Plan recognizes modes of transportation that use the highway network (pedestrians, bicyclists and community transportation) as well as other transportation infrastructure that interact with the Corridor (active rail lines, rails to trails, intermodal transportation centers, sidewalk networks in downtowns or villages).
- Every town in the Southwest Region is part of at least one Corridor. Notice Keene, which is linked with eight corridors and Peterborough which is linked by three corridors. Some towns are identified as having nodal centers—downtowns or villages that transition the regional vehicle-based travel patterns to the local and shorter distance travel patterns that are often more pedestrian and bicycle scale. Nodes can be thought of as pearls on a necklace which represents the corridor. There are 14 nodes recognized in the Plan.



- As I said earlier, the Corridor we will be speaking about today is the NH 9 East Corridor.
- Its backbone is NH 9 from the interchange in Keene to NH 12 North all the way to Hillsborough. (Although the Southwest Region jurisdiction stops at the Antrim/Hillsborough line, it makes sense to think of Route 9 extending all the way to I-89 in Hopkinton)
- It also includes parts of Routes 10, 12A, 31, 123 and 123A as well as Gilsum Mine Road in Alstead, Main St/Alstead Hill Road and Surry Road in Gilsum, Sullivan Center Street and Washington Street in Keene, Granite Lake Road and Nelson Road in Nelson, Centre Street in Sullivan and Gilsum Road in Surry.
- Towns that are recognized as part of this corridor are in alphabetical order Alstead, Antrim, Gilsum, Keene, Langdon, Nelson, Marlow, Sullivan, Surry, Stoddard and Windsor.



- Each Corridor is based in part on “travelsheds”. This is a map showing travelsheds associated with NH 9 East Corridor.
- The travelshed concept is derived from the watershed concept, showing the origin of where many trip origins and destinations in Southwest NH start to use NH 9 East, much like how stream networks converge into rivers. It is intended to show geographical areas that are connected with each other through Corridors.
- The arrows show directions of travel associated with different travelsheds. The travelsheds are different blocks of color of other regional districts that would be a likely origin or destination connected by the NH 9 East Corridor.
- For example, it is not unusual for a trip starting as far away as Hinsdale or Winchester to use NH 9 East to reach Concord or other destinations farther east. Many locals in this travel shed know that even to travel to Manchester, it is often faster to take NH 9 East rather than NH 101 even though it is longer trip by distance. For Southwest Region towns in the dark grey, it is less likely that they would use NH 9 East.



- For each corridor, the Plan shows available multimodal services and infrastructure. These are things like intercity bus services, public transportation, rail trails, railroads, airports, intermodal facilities, nodal centers with sidewalks, etc.
- NH 9 East has very little to offer in this respect. Community transportation needs for people that don't drive would need to rely on family or neighbors or one of the volunteer driver services operating in the Region.

Population Projections

Communities	2010	2040	Projected % Change in Population	Projected Total Population Change
Alstead	1,937	1,923	-0.7%	-14
Antrim	2,637	2,917	10.6%	280
Gilsum	813	850	4.6%	37
Keene	23,409	24,260	3.6%	851
Langdon	688	836	21.5%	148
Marlow	742	734	-1.1%	-8
Nelson	729	830	13.9%	101
Roxbury	229	220	-3.9%	-9
Stoddard	1,232	1,560	26.6%	328
Sullivan	677	600	-11.4%	-77
Surry	732	794	8.5%	62
Windsor	224	256	14.3%	32
NH 9 East Corridor	34,049	35,780	5.1%	1,731
SWRPC Region	102,313	108,168	5.7%	5,855

- Low growth – a departure from previous decades
- Some communities projected to lose population

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- Between 2010 and 2040 the Southwest Region is projected to grow just 5.7%. Contrast this to the previous thirty year period, 1980-2010 in which the region grew 30%. Between 2010-2040 NH 9 East Corridor towns are projected to grow even slower than the rest of the Region at 5.1%.
- Notice that 4 towns are projected to lose population.
- Total population and expected growth are important considerations, but there are other trends to be mindful of. Although New Hampshire has grown in population over the last decade, travel hasn't. We travel less today than we did 10 years ago according to annual vehicle miles traveled.

Population

	All Corridor Communities	Proportion of Corridor Population	Communities with Above Average proportion of Special Populations
Youth (Age 15 and Under)	5,240	15%	Alstead (19%); Antrim (19%); Gilsom (17%); Langdon (18%); Nelson (16%); Roxbury (16%); Sullivan (16%); Stoddard (20%); Windsor (16%)
Young Adults (Age 16-34)	10,610	31%	Keene (37%)
Middle Age (Age 35-64)	13,124	39%	Alstead (46%); Antrim (47%); Gilsom (49%); Langdon (47%); Marlow (53%); Nelson (46%); Roxbury (48%); Sullivan (49%); Surry (50%); Stoddard (46%); Windsor (48%)
Seniors (65 and older)	5,080	15%	Alstead (16%); Langdon (17%); Marlow (16%); Nelson (16%); Stoddard (20%); Surry (18%)
Racial Minorities	1,365	4%	Keene (5%)
Low Income (Population at or under 150% of Poverty Level)	6,597	19%	Keene (22%)
Single Parent Households	2,474	31%	Downtown Antrim (40%); Keene (36%)

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• How is the transportation system serving different segments of our population?

- The total population of NH 9 Corridor communities was 34,049 as of 2010.
- This chart is meant to show subsets of that population. Generally speaking these segments of population tend to have different transportation needs.
- Youth, age 15 and under, represent a subset of the population that does not drive. These are individuals that depend on other drivers for the most part in the Corridor, because there is a lack of other options to travel independently and many destinations are beyond a walkable or bike-able distance.
- Existing trends suggest that young adults—often called “Millennials”—are less likely to want to own a car today. The highest proportion of this group exist in Keene, where a more urban environment may be able to allow for this lifestyle.
- Middle age—people ages 35-64—represent a large proportion of families and the labor force. These folks often need flexibility in transportation to make trips for work, shopping, recreation, daycare, school, etc.
- Seniors drive less than younger age cohorts, and they create a demand for transit, demand response, volunteer driver, and other services to meet their needs when they can no longer safely drive.
- Here is a good place to point out one of the Goals in *Southwest Connects*: “Goal 3: The transport system will provide people of all ages and abilities timely access

to goods, services, recreation, entertainment and companionship.” Ask yourself, are there projects or strategies that would allow this corridor to better meet this goal?

Travel and Vehicle Trends

Community	Traffic Count Location Description	Week Starting	Total	Motorcycles, Cars, Light Duty Trucks	Buses and Single Unit Trucks	Trailer Trucks
Antrim	NH 9 W at Hillsborough TL	8/19/2014	5,951	89.9%	3.5%	6.6%
Keene	NH 9 W of Washington St	8/19/2014	10,496	92.5%	3.5%	3.9%
Keene	Washington St S of NH 9	8/19/2014	5,629	97.5%	2.2%	0.3%

- Difference in # of trailer trucks on NH 9 between Antrim (392) and Keene (409) is small, supporting through route role of NH 9.

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- Traffic on NH 9 ranges from 9300 AADT in Keene west of Washington Street to almost 6,000 AADT in Antrim. It drops to as low as 5300 AADT in Stoddard.
- A good amount of truck freight passes on the corridor. In Antrim, tractor trailer trucks have been counted to be over 6% of the entire traffic mix.
- Here is a good place to point to Goal 1 from Southwest Connects: “The transport system will be managed to support and enhance the regional economy.” How vital is this corridor to the regional economy?

Commuting and Economy

NH Communities with 50 or more employees commuting to NH 9 communities and likely using NH 9 East Corridor

Employee Origin	Number	Employee Destination
Alstead	304	Keene
Manchester	303	Keene
Stoddard	183	Keene
Concord	131	Keene
Gilsum	128	Keene
Merrimack	128	Keene
Rockingham	119	Keene
Marlow	114	Keene
Nelson	101	Keene
Sullivan	96	Keene

Employee Origin	Number	Employee Destination
Hillsborough	78	Keene
Derry	74	Keene
Dover	74	Keene
Rochester	72	Keene
Antrim	71	Antrim
Antrim	64	Keene
Salem	59	Keene
Londonderry	56	Keene
Hancock	53	Keene
Newport	53	Keene
Portsmouth	50	Keene

Jobs and Employers in Communities on NH 9 East Corridor

Community	Total Jobs	Total Institutions
Alstead	148	38
Antrim	401	53
Gilsum	129	17
Keene	16,946	864
Langdon	94	18
Marlow	64	12
Nelson	18	N/A
Roxbury	3	N/A
Stoddard	63	16
Sullivan	30	10
Surry	39	14
Windsor	16	N/A

- Largely “bedroom communities” to Keene
- Large proportion of commuters coming from outside Region

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- The tables on the left show that Keene is an important destination for most of the communities on the NH 9 East Corridor including Alstead, Stoddard, Gilsum, Marlow, Nelson, Sullivan and Antrim.
- The tables on the left also shows how important NH 9 is as a regional facility in terms of providing a way to get to Keene from places as far away as Portsmouth or Rochester.
- Although the tables on the left only show incoming commuters, the story of outgoing commuters is that many commute to places like Manchester or Concord—commuters that would also use NH 9 East.
- Keene dwarves other NH 9 East communities in the number of jobs and employers that it hosts. Many of the NH 9 East communities are “bedroom” communities for their residents.

Housing and Land Use

	Housing Permits (2000-2010)	Owner/ Renter Household Ratio	Median Expenses (Owners w/ a Mortgage)	Median Expenses (Owners w/o a Mortgage)	Median Gross Rent (2011)	Median Monthly Budget Needed for Transportation
Corridor Community	87	5.7	\$1,633	\$621	\$989	\$1,513
Alstead	91	3.3	\$1,460	\$558	\$792	\$1,505
Antrim	149	2.7	\$1,701	\$618	\$904	\$1,549
Antrim Village	N/A	1.7	\$1,693	\$605	\$823	\$1,481
Gilsum	28	6.8	\$1,225	\$703	\$950	\$1,528
Keene	379	1.2	\$1,764	\$828	\$962	\$1,149
Langdon	39	8.7	\$1,528	\$593	\$930	\$1,572
Marlow	35	7.9	\$1,810	\$498	\$1,225	\$1,566
Nelson	44	2.8	\$1,896	\$559	\$967	\$1,522
Roxbury	11	8.0	\$1,792	\$800	\$1,179	\$1,522
Stoddard	178	6.8	\$1,520	\$447	\$973	\$1,561
Sullivan	20	6.6	\$1,442	\$732	\$981	\$1,522
Surry	53	8.4	\$1,870	\$724	\$1,019	\$1,528
Windsor	19	4.9	\$1,588	\$388	N/A	\$1,630

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- Some towns more active permitting than others
- Mostly owner occupied housing
- Higher transportation budgets for Alstead, Gilsum, Langdon, Stoddard, Sullivan and Windsor

- This table, which is included in the *Southwest Connects* Plan, shows a variety of housing and land use data that is useful for interpreting the transportation system.
- The housing permits column shows the relative growth of each community in the NH 9 East corridor. Alstead, Antrim, Keene and Stoddard grew much faster in the 2000s than the other communities. From a transportation perspective, each house could represent new traffic generation.
- Owner/Renter Household Ratio can give a good picture of the types of housing that is roughly available for households and families based on their economic status and preferences for owner or rental housing. The predominance of owner occupied homes may infer a preponderance of households that are ok with vehicle transportation system, while the higher percentage of rental properties may infer a greater need to provide more affordable transportation alternatives. It helps to know the community to determine if these assumptions are in line with reality.
- The next three columns capture household cost, which taken in context with owner/renter household can provide a snapshot of cost of living in the community. Together housing and transportation make up the two highest

household expenses for households.

- The final column is a tool that looks at household travel patterns based on availability of transportation, gas prices, predominant insurance costs, typical transportation expenditures, commuting patterns, and average household trip data. Here we can see the higher cost of transportation for households living in a bedroom community.
- Sources: NHES, Census, ACS, CNT (\$3.39 gas), red is below average, green is above average. Keene has lowest cost for transportation.

Performance Measures

- Improve asset condition
- Improve safety
- Improve mobility
- Improve multimodal accessibility
- State highway pavement in good or fair condition
- Bridge Condition
- Highway fatalities
- Highway incapacitating injuries
- Peak hour volume to capacity ratio
- Bikeways, sidewalks, public transportation

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- MAP-21 national goals include safety, infrastructure condition, congestion reduction, system reliability, freight movement, environmental sustainability, and reduced projected delivery delays.
- In this section we will review USDOT MAP-21 performance targets and measures, they are a key part of federal transportation funding because they define a performance and outcome-based program that all states are required to implement
- Southwest Connects reports on some of these metrics to increase understanding of how our region compares to state and national targets
- We will highlight a few of these measures today. Some measures in the plan are not applicable for this corridor. For example, there is no park and ride facility, which would meet the goals of improving mobility or multimodal accessibility

Improve Asset Conditions:

- Pavement Condition: From MAP-21 Proposed Rule
- Bridge Condition: From MAP-21 Proposed Rule
- Red List Bridges: From NHDOT Balanced Scorecard
- Rail Lines Capable of Speeds of 40 MPH: From NHDOT Balanced Scorecard
- Airport Runway Surface Conditions: From NHDOT Balanced Scorecard
- Remaining Useful Life of Transit Buses: From NHDOT Balanced Scorecard

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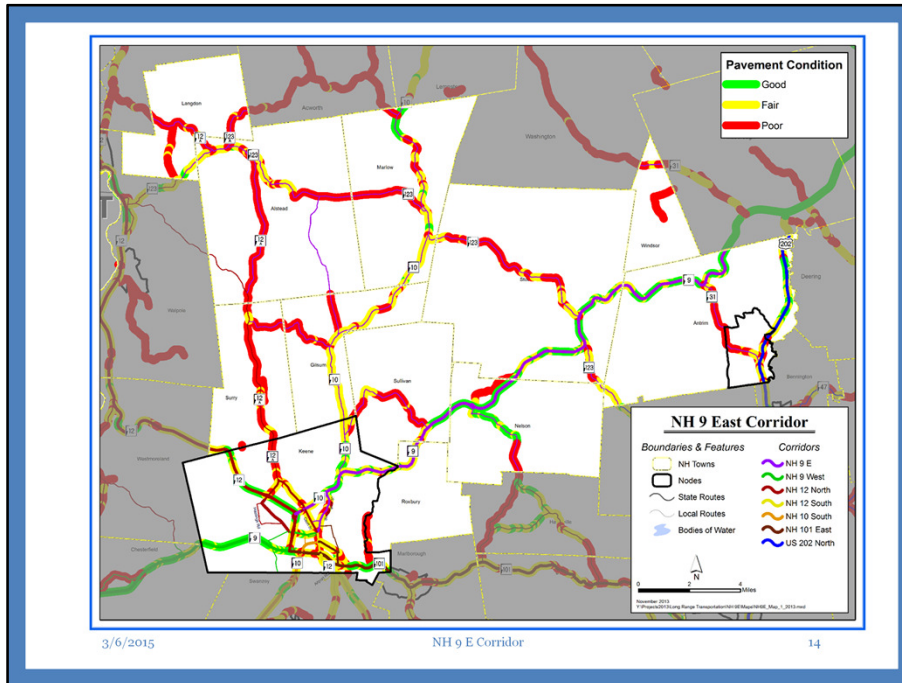
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- Some performance measures have not yet been finalized
- The proposed pavement and bridge condition performance measures are currently within their comment period (Ending April 6, 2015).
- The four *proposed* measures to assess pavement condition are: (1) Percentage of pavements on the Interstate System in Good condition; (2) Percentage of pavements on the Interstate System in Poor condition; (3) Percentage of pavements on the NHS (excluding the Interstate System) in Good condition; and (4) a Percentage of pavements on the NHS (excluding the Interstate System) in Poor condition. The IRI or International Roughness Index, Cracking Percent, and Rutting determines if a segment is in Good, Fair, or Poor condition. For example, IRI: For non-urbanized areas, Less than 95 = Good, 95-170 = Fair, Greater than 170 = Poor. The remaining two measures are assigned good, fair, or poor values. If all three are good, the segment is good. If two or more are poor, it is rated poor.
- Bridge condition is monitored through the National Bridge Inventory and there are two bridge performance measures under MAP-21: percentage of NHS bridges in good condition and percentage of NHS bridges in poor condition. The ratings of Good, Fair, and Poor are assigned based on the deck, superstructure,

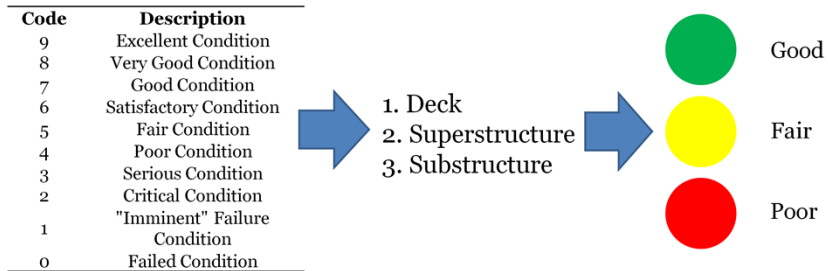
substructure, and culvert ratings from the NBI.

- Under the Balanced Scorecard, any bridge with a major structural element in poor condition is a red list bridge. Every bridge is inspected at least once every two years, state-owned red-listed bridges are inspected twice per year, and municipal red-listed bridges are inspected at least once per year.
- Rail lines, airport runway and transit buses do not apply to NH 9 East corridor. In Southwest Connects, these statistics are calculated using the measures in the NHDOT Balances Scorecard



- Under the FHWA proposed rule, NH will establish a statewide target for pavement and bridge condition measures. The minimum level per FHWA is that no more than 5% of lane miles on the Interstate System may be in poor condition. NHDOT may establish addition targets, but they are not known.
- A van, with specialized sensors, records pavement condition attributes in 1/10th of a mile increments in one direction. National Highway System mileage is surveyed every year. Unnumbered state highway (Gilsum Rd., Sullivan Center St., etc.) is surveyed every other year.
- 2011-2012 NHDOT data displayed in the current slide is based on Ride Comfort Index (RCI) only (0-5 scale): Good is > 3.5, 2.5 – 3.5 is fair, < 2.5 is poor. RCI is based on the International Roughness Index (IRI), one of three measures to be utilized under the MAP-21 performance measure proposed rule-making. The other two were cracking and rutting. Cracking was not included in the 2011-2012 dataset.
- NHDOT is currently prepared 2013-2014 data, which will include cracking.
- NH 9 East Only 23.4 miles / 25.4 miles = 92.1% in fair or good condition
- NH 9 E Arterials and Collectors = 29.4 miles / 78.7 miles = 37.4% in fair or good condition
- NH 9 East Corridor System 52.8 miles / 104.1 miles = 50.7% in fair or good condition
- The highest need for rehabilitation is off Route 9

Bridges



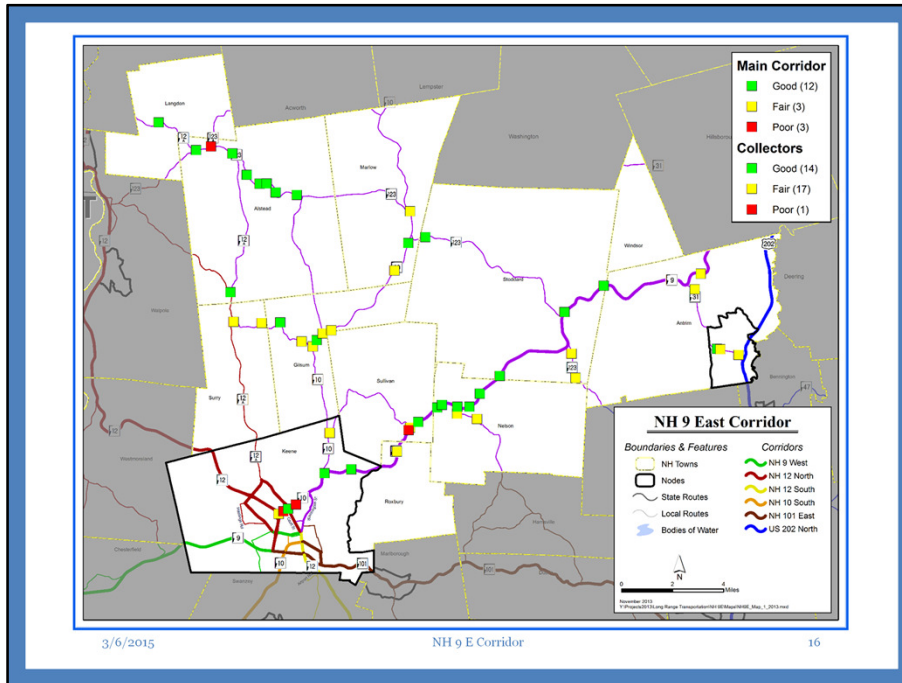
Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges
USDOT FHWA Report No. FHWA-PD-96-001

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- Bridge inspection data is available once per year (April) from the Department of Transportation, figures may be somewhat of a lagging indicator, depending on the time of inspection
- Under MAP-21 performance measures, the deck, superstructure, and substructure of each bridge are rated on a scale from 0-9. If all 3 are 7 or higher, the bridge is in good (green) condition. If 1 item is 4 or less, the bridge is in poor (red) condition.
- Under the proposed rule, all states must maintain bridges on the National Highway System (including NH 9 E) so that the percentage of the deck area of the bridges classified as structurally deficient does not exceed **10 percent** of overall deck area in the state.
- In general, a structurally deficient bridge is one with a condition rating of 4 or less in the Deck, Superstructure, Substructure, or Culvert categories and an appraisal rating of 2 or less in the Structural Condition or Waterway Adequacy National Bridge Inventory categories.



- There are 50 bridges throughout the corridor system, 4 are in poor or “red-listed” condition: 3 bridges on the main corridor, and 1 on a secondary numbered route are in poor condition.
- Note that due to timing of inventory, 2 bridges are shown in Keene that have been repaired are displayed in Poor condition
- The majority of main arterial (NH 9) bridges are in good condition, the majority of collector and minor arterial bridges are not.
- Deck area on the main arterial or main corridor shows the greatest need for improvement.
- Main Corridor, total of 22,5456 sq. ft. (red) / 82,795 sq. ft. (total bridge area) = 27% in Poor Condition
- Collectors, total of 990 sq. ft. (red) / 37,061 sq. ft. (total bridge area) = 3% in Poor Condition
- In Keene, two bridges are in poor condition (from west to east):
 1. NH9E Keene 129/093 (over Ashuelot River), originally built in 1978, deck rated 4 – Rehab completed in 2014 under project 22272 with two other Keene bridges not in the NH9E corridor
 2. NH9E Keene 129/099 (over Elm Street), originally built in 1978, deck rated 4 – Rehab planned under 16152 in 2021
- In Sullivan, one bridge is in poor condition:

1. NH9E Sullivan 093/061 (over Otter Brook), originally built in 1932, deck rated 4, substructure rated 5 – Replacement scheduled for 2017, scour from erosion was a particular concern, part of programmed project Roxbury – Sullivan 10439, \$6 million
- In Alstead, one bridge is in poor condition:
 1. NH123A Alstead 073/163 (over Warren Brook), originally built in 1935, deck rated 4, substructure rated 5 – Damaged during 2005 flooding, replacement 2022, \$2.4 million

Explain where red list bridges are, explain which bridges have been addressed or are programmed to be addressed

Improve Safety:

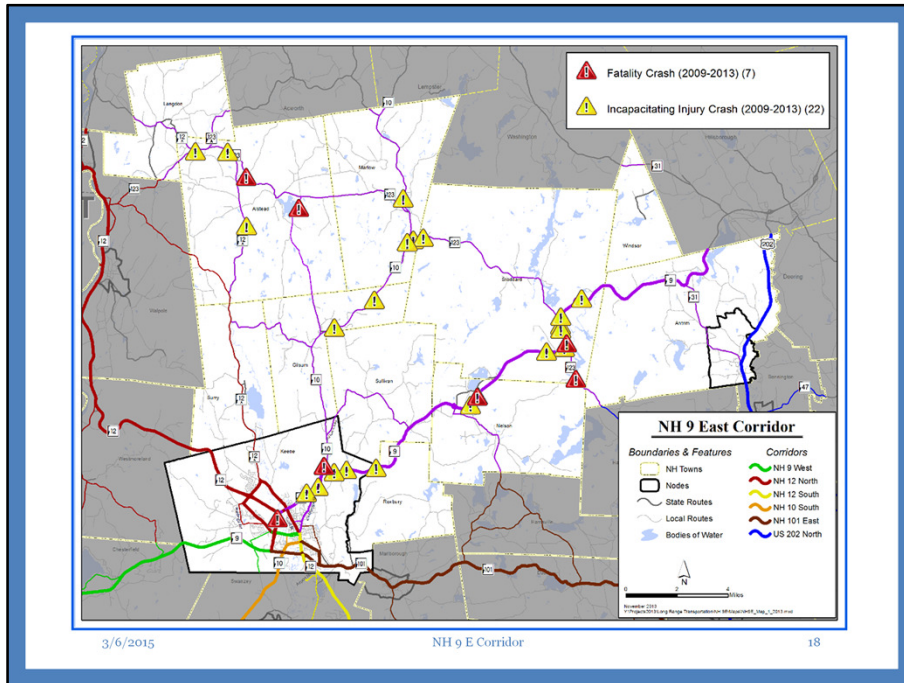
- Fatalities: From MAP 21
- Serious Injuries: From MAP 21

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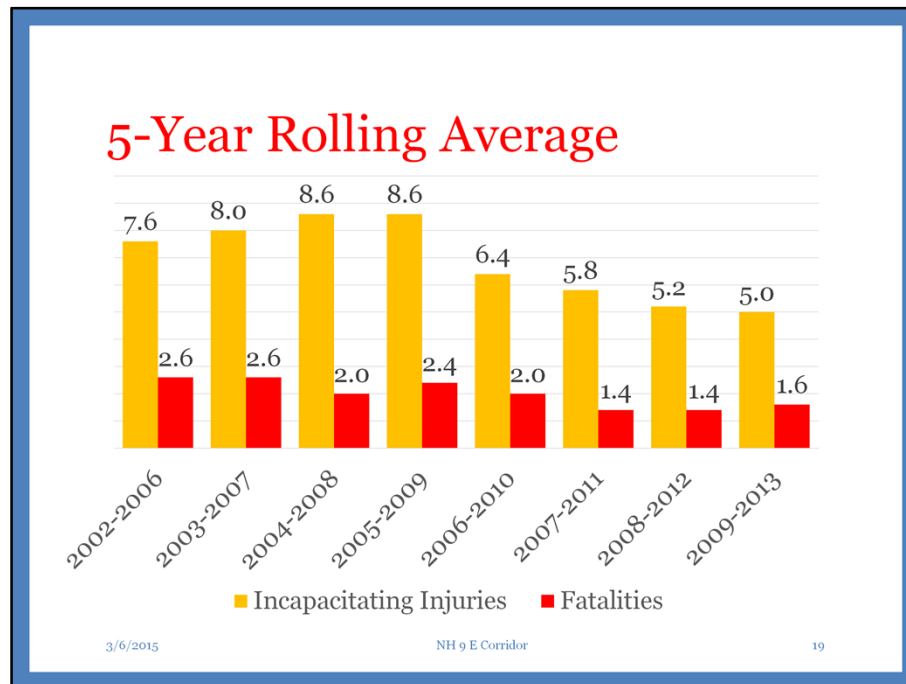
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- MAP-21 continues the Highway Safety Improvement Program (HSIP) to reduce traffic fatalities and serious injuries on all public roads, including local roads.
- NHDOT is required to assess series injuries and fatalities per vehicle miles traveled.
- Safety data is collected through the NH Department of Safety and every occupant involved with a collision is assigned an injury status at the scene. The highest severity status is a “fatal injury” (at scene or within 30 days of injury), followed by “suspected serious injury/incapacitating injury” (laceration, broken extremity, burns, unconsciousness, paralysis, etc.)
- Safety performance measures are proposed as the 5-year rolling averages for fatality and serious injury numbers and fatality and serious injury rates by 100 million VMT, and are applicable to all public roads regardless of ownership or functional classification.
- Under the rule, state will set annual targets based on the calendar year.

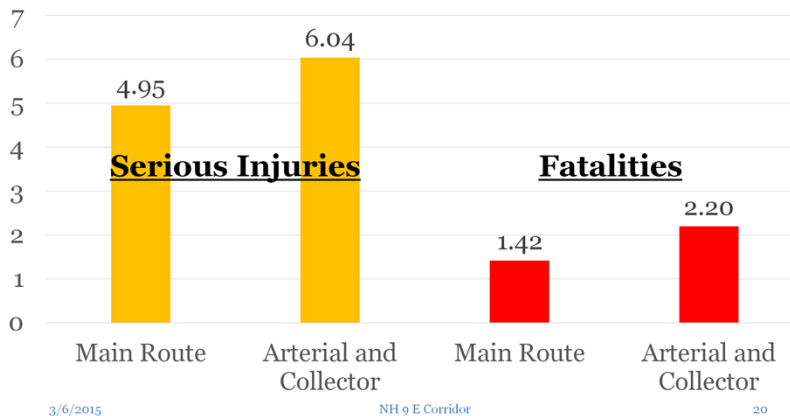


- At each fatality crash location there may be more than one fatality and there may be incapacitating injuries
- At each incapacitating injury crash there may be multiple incapacitating injuries
- Over the 2009-2013 time period, there were a total of 8 fatalities and 25 incapacitating injuries.



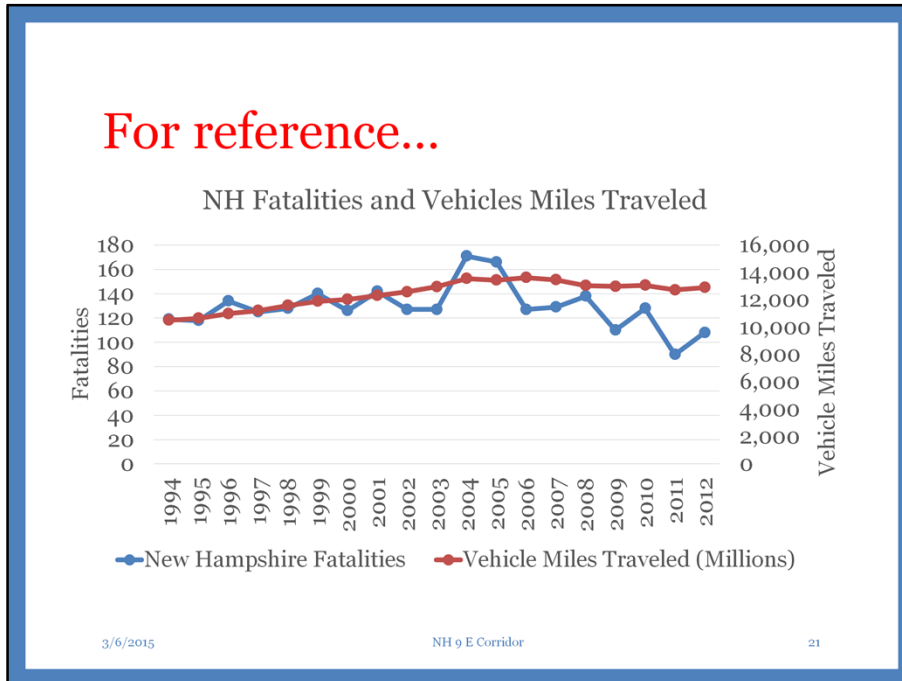
- First, we examine the rolling average of serious injuries and fatalities, this reduces “spikes” that may happen from year to year. In the most recent 5-year period, the NH9E corridor system accounted for 5 incapacitating injuries per year and 1.6 fatalities per year. 2014 data is not yet available.
- It is a fairly straightforward calculation. There were 8 total fatalities throughout the corridor system 2009-2013 = 1.6 fatalities/per year
- NHDOT supports this effort through a target of zero deaths and to reduce the five-year average fatalities and serious injuries 50 percent by 2030.

Per 100 Million VMT (2009-2013)



- In the previous slide, all segments of road were treated equally regardless of their mileage or traffic volumes.
- In this slide, the principal arterial or “main route” is separated from the minor arterials and collectors that make up the NH9E corridor system.
- Recorded traffic volumes were used to estimate the annual traffic in vehicle miles traveled or VMT.
- In this analysis, serious injury and fatality rates per vehicle mile traveled are higher off of the main corridor.

For reference...



It should be noted that fatalities are not inherently tied to total vehicle miles traveled and that vehicle miles traveled vary from year to year. Between 1994 and 2004, fatalities appeared to be closely related to miles driven. Since then, travel has stagnated or decreased. Total fatalities have also declined.

Mobility: Volume/Capacity Ratio

- FHWA Proposed Rule not out yet
- Balanced Scorecard was Level of Service but likely discontinued.
- SWRPC temporary performance measure is vehicle/capacity ratio.

- A – No Congestion, Free flow conditions, operations constrained by road geometry ($V/C < 0.6$)
- B – Free flow, similar travel speeds as LOS A, less freedom to maneuver
- C – Travel speed and ability to maneuver further reduced
- D – travel speed further reduced
- E – Near capacity
- F – “forced or breakdown flow”

Town	Location	Peak Weekday PM	Year	Lanes	Capacity	V/C ratio	Terrain	Speed	LOS
Keene	NH 9 W of Washington St	938	2012	3	4200	0.22	Hilly	>40	A
Keene	NH 9 E of Washington St	1127	2011	4	5600	0.20	Hilly	>40	A
Sullivan	NH 9 W of Centre St	668	2011	2	2800	0.24	Hilly	>40	B
Nelson	NH 9 @ Sullivan TL	716	2013	3	4200	0.17	Hilly	>40	A
Nelson	NH 9 @ Stoddard TL	608	2013	4	5600	0.11	Hilly	>40	A
Stoddard	NH 9 W of NH 123 S	565	2011	2	2800	0.20	Hilly	>40	B
Stoddard	NH 9 E of NH 123 N	484	2011	2	2800	0.17	Hilly	>40	A
Stoddard	NH 9 @ Antrim TL	486	2011	2	2800	0.17	Hilly	>40	A

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- Density is primary performance measure for level of service. A section of highway with certain physical attributes has a set capacity of vehicles over a given period of time. A volume to capacity ratio looks at the observed volume and the capacity of a given section to assign a letter grade that describes the flow of traffic.
- By this measures, the corridor does not experience significant degradation in traffic flow, even during peak hours.
- NHDOT continues to research new ways of analyzing level of service and travel time through the National Performance Management Research Data Set (NPMRDS)

Multimodal Accessibility:

- Sidewalks: From Monadnock Region Transportation Management Association (MRTMA)
- Bikeways: From MRTMA
- # of Park and Ride Lot Spaces: From MRTMA
- Public Transit Routes: From MRTMA
- Intercity Bus Routes: From MRTMA

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- Among the towns in the NH 9 Corridor, Alstead, Antrim, Gilsum and Keene are identified as having sidewalks. The total estimated length of sidewalk is approximately x miles with Keene making up x of those miles.
- In terms of bikeways, the plan looks at highways on the corridor that have paved shoulders greater than 4 feet on one side, as well as improved multi-use trails and roadways with bikelanes or sharrows
 - The total for shoulders greater than 4 feet is 15 miles, or about 14% of total miles.
 - The total of improvement multi use trails is 0 miles.
 - The total for bikelanes is .8 miles and represents Washington Street in Keene
- No Park and Ride Lots exist on the NH 9 East Corridor, although there is a park and ride lot in Hillsborough further east on NH 9.
- Part of Home, Healthcare Hospice and Community Service's transit route is on Washington Street in Keene totaling .5 miles.
- No Intercity Bus Service is available on the NH 9 East Corridor, however there is regular Dartmouth Coach service on the far east end of the Corridor passing on I-89 in Hopkinton.

Shoulder Width

- Consideration for shoulder, edge line, and centerline rumble strips
- Improve bicycle accommodation
- Space for emergency storage of disabled vehicles
- Area to avoid crashes
- Space for emergency and enforcement operations
- Improved sight lines through horizontal curves
- Driver comfort

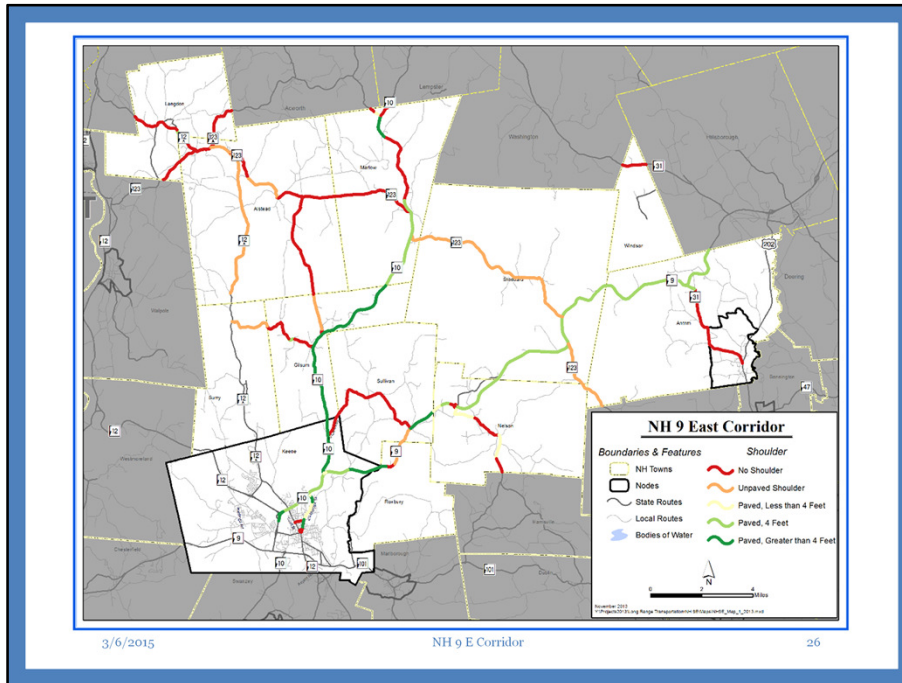
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- *Rumble strips identified in NHDOT layer...disqualify 4 feet or over if rumble strip is part of 4 feet*
- Shoulder width can be more important than lane width
- Cyclists are legally allowed to operating within the traveled lane, but separation from vehicular traffic is preferred.
- http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/

http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_shoulderwidth.h.cfm



- The map depicts areas of the corridor system without a shoulder (red), with an unpaved shoulder of any width (orange), with a paved shoulder less than 4 feet (yellow), with a paved shoulder of exactly 4 feet (light green), and with a paved shoulder greater than 4 feet (dark green).
- The main corridor has a shoulder for almost its full extent. Only 1.1 miles do not have a shoulder. Of the areas with a shoulder, it is most commonly paved, at 4 feet in width. Only 1.6 miles have an unpaved shoulder. Lane width is almost exclusively 12 feet. Only 3.29 miles out of 25.4, or 13% have a paved shoulder over 4 feet on both sides of the road.
- Other arterial and collector sections are very different. Half have no shoulder whatsoever, and an additional 25% have an unpaved shoulder. Lane width is most commonly 10 feet but varies between 9 feet and 12 feet. Only 10.8 miles out of 79.2 or 14% have a paved shoulder over 4 feet on both sides of the road.

Challenges and Opportunities

- Focus on reducing crashes: NH 9, as a hilly, curvy high speed rural highway with a history of crashes, including fatality crashes
- Focus on protecting corridor from excessive curb cuts: 11.4 miles of NH 9 highway frontage between I-91 and I-89 is not protected by state limited or controlled access regulations
- Focus on need for accomodating low income and non-drivers: Corridor residents' dependence on long distance travel for basic needs makes communities experience some of the highest household transportation costs in the Southwest Region
- Focus on hazard mitigation: NH 9 parallels major brooks (Otter Brook and North Branch River) that are limited in their capacity to handle severe storm events and may impact highway and bridge infrastructure
- Other Transportation Challenges or Opportunities?

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- These are challenges and opportunities that are described in the NH 9 East Corridor section of *Southwest Connects*.
- One theme is that NH 9 is often used for higher speed regional travel or through travel, but has some curves and its rural nature makes it susceptible to unique crash conditions relating to passing and unanticipated curb cuts or intersections.
- A SWRPC NH 9 Corridor Study, produced in 2006, estimated that up to 62 million square feet of commercial land could be available for development on this stretch of highway which could impede regional mobility if not carefully planned. This is a reason that one focus is on protecting the corridor from unplanned commercial development.
- As shown in earlier slides, there are populations of seniors, youth and low income populations and a lack of transportation options. Finding ways to accommodate the transportation needs of these populations is an important concern.
- Finally, this region has been susceptible to a good deal of flooding and washouts due to the hilly topography, and many streams and rivers that course through the area.
- What are some other transportation challenges or opportunities?

Past Projects (2010-Current)

- **29219: Sullivan/Nelson/ Stoddard NH9 as well as Windsor NH31 (2014)**
 - Resurfacing
- **23797: Stoddard/Antrim /Hillsborough NH9 (2014)**
 - Pavement rehabilitation
- **23822: Keene/Roxbury NH9 (2014)**
 - Pavement rehabilitation
- **24082: Alstead NH12A (2014)**
 - Emergency repairs due to floods
- **22272: Keene NH9 (2014)**
 - Bridge Rehabilitation over Ashuelot River
- **24098: Alstead/Marlow NH123 (2013)**
 - Road rehabilitation from flood damaged road
- **24904: Gilsum/Surry River Rd (2013)**
 - Reconstruct flood damaged road
- **14540M: Alstead NH123 (2013)**
 - Final reconstruction 2.4 miles from flood damage from 2005
- **16120: Nelson Nelson Rd (2012)**
 - Reclaim state roadway
- **16286: Alstead NH12A (2012)**
 - Replace 48" Reinforced Concrete Pipe
- **15914: Langdon NH12A Bridge #117/101 (2012)**
 - Maintenance and painting
- **23408: Sullivan Centre St (2012)**
 - Reconstruct flood damaged road

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- Here are some recent investments that have been made by NHDOT on the NH 9 East Corridor since 2010.
- This does not include SB367 projects which included some additional work on NH 9 East in Sullivan, Roxbury and Keene and NH 123A in Alstead.

Future Projects (Programmed)

- 20817: Alstead, NH 123A: Replace Single Span Bridge Over Warren Brook - 073/163 {Red List} (2020-2021)
- 16152: Keene, NH 9/10: Bridge Rehabilitation - 129/099 {Red List} (2021)
- 10439: Roxbury and Sullivan, NH 9: Reconstruct shoulders & widen from East Sullivan, South 2.04 mi, including bridge replacement - 093/061 {Red List} (2017)
- 28513: Statewide: Rumble Strips including on selected parts of NH 9 East (2015)

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- And here are some projects currently programmed in the current Ten Year Plan.

Future Projects?

- Gilsum, NH 10: Rehab/reconstruction to address pavement transverse/tent cracking and heaving in the winter, from northerly intersection of Riverside Rd to the northerly intersection of Old Marlow Road, 2.4 miles.
- 16073: Stoddard, Antrim and Hillsborough, Capacity, safety improvements and acquire controlled access ROW
- 24094: River Road Gilsum/Surry Rain Storm Damage (6/28/13)
- 29537: Surry, Gilsum Road over Thompson Brook Bridge Replacement
- 24098: NH123 Alstead/Marlow Rain Storm (6/28/13)
- 29409: Alstead, NH12A alignment and profile improvement

ADDITIONAL DISCUSSION?

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