

# **SOUTHWEST NH TRANSPORTATION ADVISORY COMMITTEE**

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## **NH 10 South Corridor**

August 1, 2016

- This marks the fifth in a series of discussions SWRPC is holding on Corridors identified in *Southwest Connects*, the new Long Range Transportation Plan for Southwest New Hampshire. The meeting will feature the NH 10 South Corridor.
- As part of this series SWRPC staff has reached out to municipalities that are part of the Corridors 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 state and 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 many 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

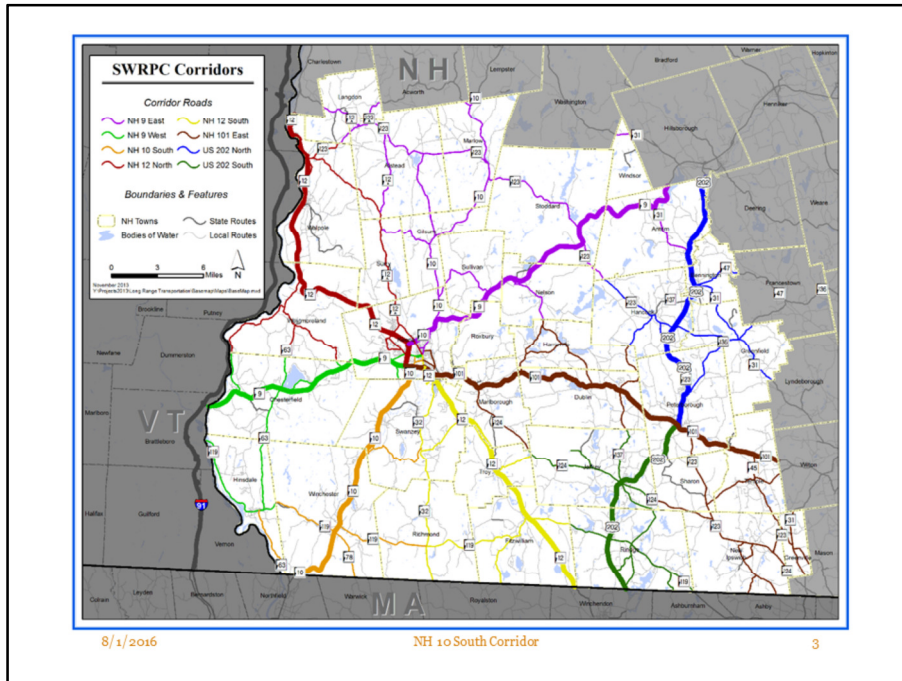
- Corridor Features and Location
- Population
- Commuting & Economy
- Housing & Land Use
- Travel & Vehicle Trends
- Performance Measures
- Challenges & Opportunities
- Past & Future Projects

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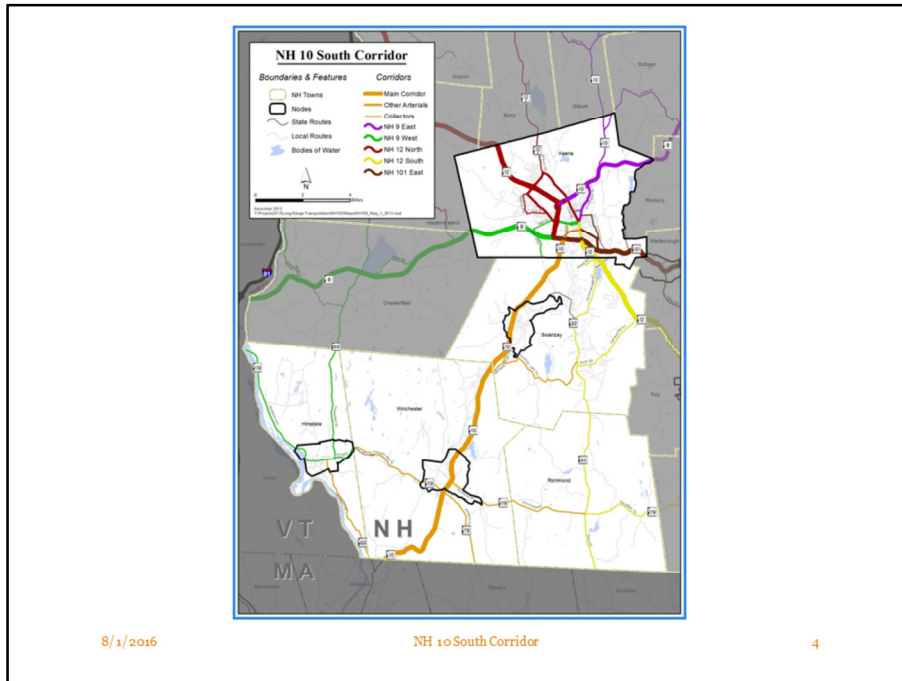
NH 10 South Corridor

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- Today's presentation will begin with an orientation and description of the NH 10 South 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.



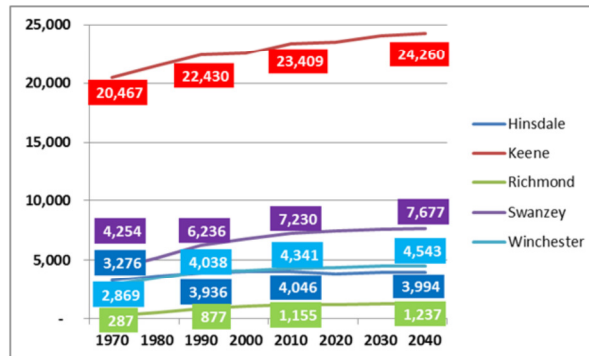
- This is a map of Southwest NH showing the eight corridors that were identified in *Southwest Connects*, with each Corridor represented by a different color.
- Corridors are based on data SWRPC collected recognizing direction of travel patterns, traffic volumes, federal highway classifications (federally 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 highways as well as collector roads that link to the arterial highways. 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.



- The Corridor we will be speaking about today is the NH 10 South Corridor. The NH 10 South Corridor is represented in orange.
- In our region, the corridor starts as Winchester Street at the intersection of Main Street in Keene and then continues from the intersection of NH 10/12/101 in Keene to the down to the NH/MA State Line in Winchester. (Although the Southwest Region jurisdiction stops at the Massachusetts boundary, it makes sense to think of Route 10 extending all the way to Interstate 91 in Bernardston, MA.)
- NH 10 and Winchester Street are both considered minor arterials by USDOT and NHDOT.
- The NH 10 South Corridor includes major collectors NH 63 (south of NH 119) in Hinsdale, Island Street in Keene, NH 119 to NH 32 in Richmond, and NH 119 and NH 78 in Winchester.
- The NH 10 South Corridor also includes one minor collector in Swanzey. The collector is Westport Village Road from Homestead Ave/Swanzey Lake Road to NH 10.
- Towns that are recognized as part of this corridor include Hinsdale, Keene, Richmond, Swanzey and Winchester.
- In our plan we used census designated places as a way to describe town centers that are part of the corridor. These are denser places where walkability and bikeability and a sense of place are extremely desirable and where transportation policy decisions should be context sensitive. Census designated areas along the corridor include the town centers of Hinsdale, Keene, Swanzey and Winchester. Incidentally, two of the town

centers have taken major steps to improving walkability and bikeability by adopting complete streets policies. Hinsdale is in the process of adopting a policy and SWRPC has approached Winchester to see if they are interested in exploring a policy as well.

## Population: Past & Future



Source: US Census and NH Office of Energy and Planning

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- I want to start by talking about population change on the Corridor.
- Populations within the towns range from a little over 1,000 people in Richmond to 24,000 people.
- In the thirty year period between 1980 to 2010, when NH grew by 43%, Richmond grew by 123%, Swanzey grew at a rate of 39%, and Winchester, Hinsdale and Keene at rates of 25%, 11% and 9% respectively.
- You can see from the chart that Hinsdale and Winchester population rank in 1990.
- Demographers project that growth will be slow from here on in until 2040, the time period shown in the green box.

## Population: Special Populations

- Youth (Age 15 and over)
    - 6,501 (16% of entire corridor population)
    - Higher than average (16%): All locations besides for Keene
  - Low Income (Population at or under 150% of poverty level)\*
    - 8,093 (20% of entire corridor population)
    - Winchester 30%, Downtown Winchester 49%
  - Single Parent Households\*
    - 3,178 (34% of all corridor households)
    - Downtown Hinsdale 42%, West Swanzey 45%, Downtown Winchester 53%
- \*Highest proportion and total number among all corridors**

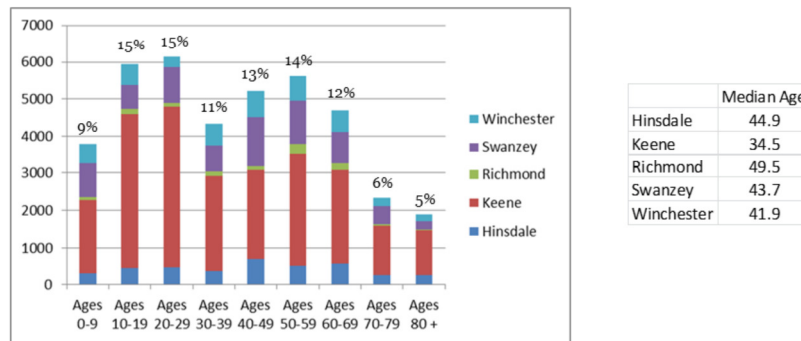
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- The NH 10 Corridor has a high proportion of youth, low income population, and single parent households.
- There is a greater number of low income population and single parent households compared to all other 8 corridors in the SW Region.

## Population by Age Groups



Source: American Community Survey 5 Year Estimates 2014

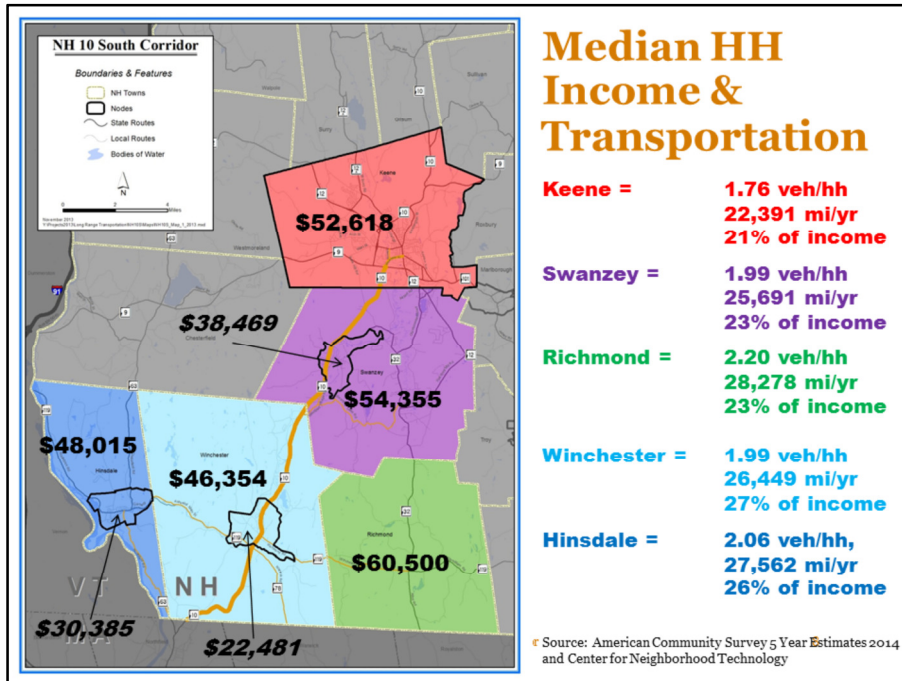
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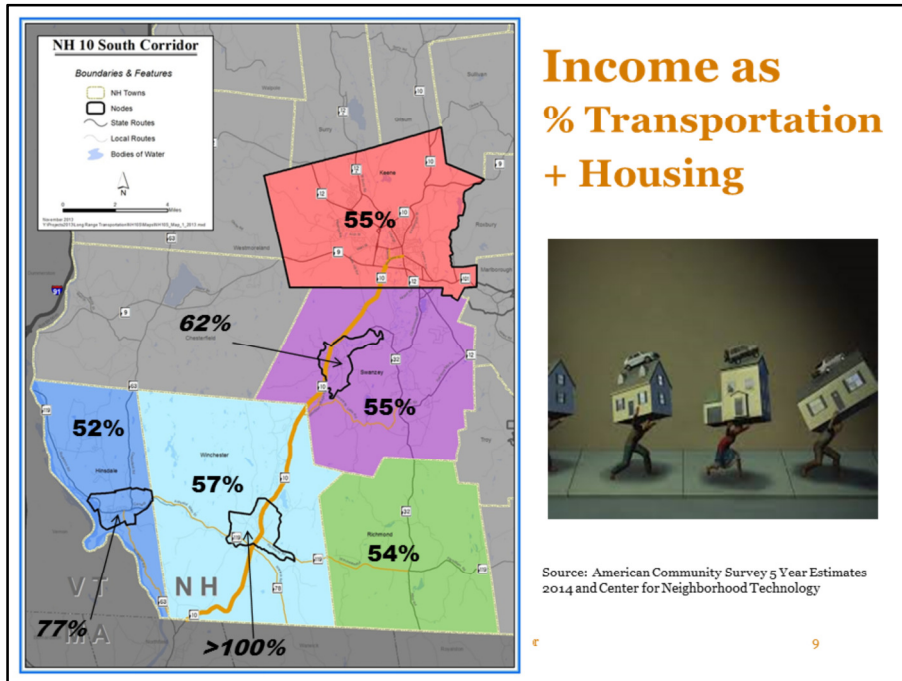
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- I've taken the five towns in the Corridor to analyze the distribution of age groups by decade
- A large 60+ and older aging population—happening in other parts of Southwest NH—and NH—is also a trend on the NH 10 South corridor
- Overall the largest age cohort today is the 20-29 year olds--about 15% of the entire population's corridor, but that is quickly followed by 10-19 year olds. This is largely because of Keene State College. Keene State enrolled about 4,500 in 2015.
- Other sizable age cohorts are people in their 40s, 50s and 60s. Without the college—the top three age cohorts are 40-49, 50-59 and 60-69 year olds
- The college brings Keene's median age down to 35 years old

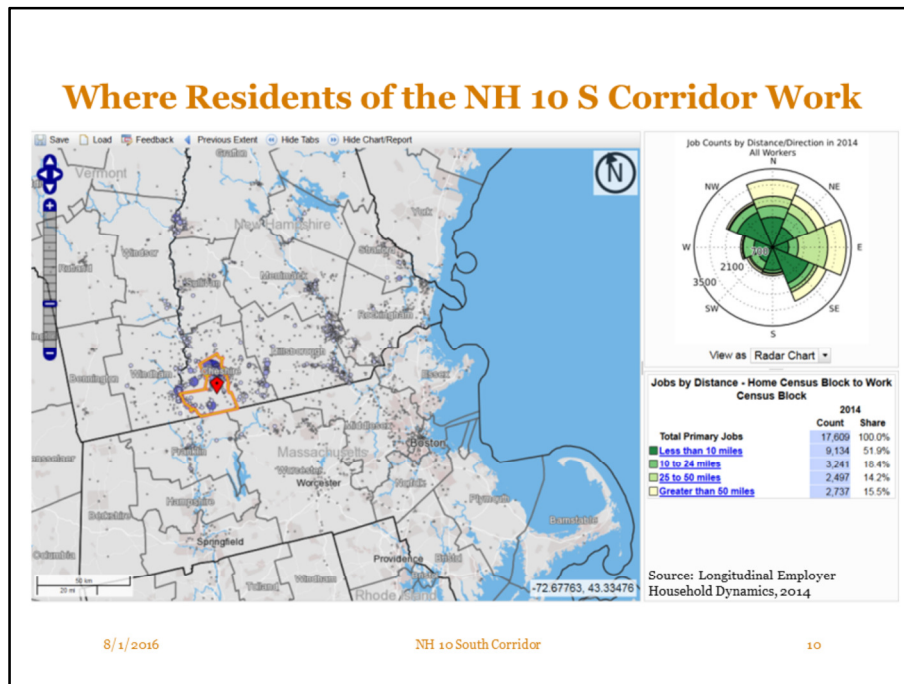




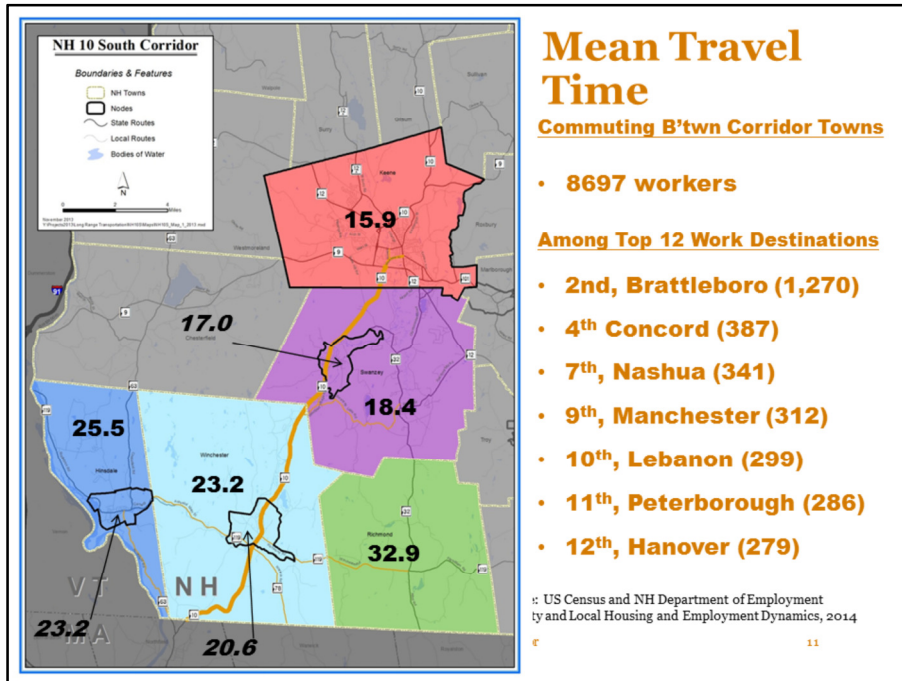
- Median annual income on the corridor varies widely ranging from about \$22,481 in Winchester to over \$60,500 in Richmond
- The Center for Neighborhood Technology, which is a think tank that has built models to understand the cost of transportation shows the proportion of income that a typical household spends on transportation. This methodology accounts for census data on vehicles and commuters per household, sample odometer readings, commuting data, and consumer expenditure survey data. The data shown on the map is calibrated to \$2.10 per gallon gas prices and based on ACS 2014 Census Median Incomes by town.
- Based on this data, it is estimated that half of each community's population spends at least 21 to 27% of their annual income on transportation alone (because this data is based on the median household). Half of the population spends more and half spends less than this amount.
- A higher percentage of people residing in West Swanzey village, downtown Winchester and downtown Hinsdale are expected to spend a significant amount of their income on transportation due to their much lower median household income.
- The cost of transportation is typically the second largest household expense...



- The most expensive household expense is typically housing
- Housing experts usually say that if housing is 30% or more of annual household income, then it is not considered affordable because it consumes too much of household's budget to the detriment of other important household needs such as food, clothing, healthcare, education, etc.
- The 30% housing metric continues to be an important metric...however, many experts have updated their metric to account for the second most expensive expense category—transportation—because many people sacrifice inexpensive housing for more cars or longer commutes...in other words...more expensive transportation costs...This updated metric suggests that housing and transportation shouldn't be more than 45% of household income.
- On this map all communities exceed this metric.

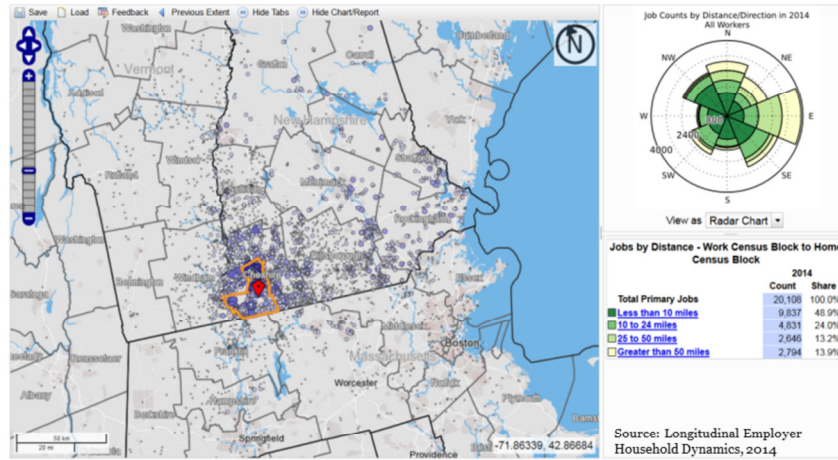


- There are many options for shopping along the Corridor in Keene, Swanzey and Winchester
- Where do residents living in the NH 10 communities work? This map shows that there are clusters of where those residents work on the NH 10 South Corridor itself, but in many other parts of the region as well, not to mention clusters in Brattleboro, VT, the Lebanon/Hanover area, and along the 101 Nashua and I-93 Corridor.
- As the radar graph shows in the upper right corner of the slide—most longer distance trips—25 miles or greater—are heading north or east to places like Lebanon/Hanover to the north and Manchester and Nashua to the east.



- This chart provides another picture of work commuting for residents living in the NH 10 South communities.
- According to the US Bureau of the Census, only Richmond residents mean commute travel time is over a half hour one way.
- Keene and Swanzey have shorter commute times—due to the high concentration of jobs near resident populations.
- On the right side of the slide, is a list of some of the top work destinations for the US Corridor communities. These types of destinations help bring the mean travel times up. The eastern pull of long distance drives shown on the previous slide are largely due to a number of people commuting to Nashua, Manchester and Peterborough. The northern pull of long distance drives is due to a number of people that commute to Lebanon and Hanover.
- The numbers in parentheses to the right represent the number of people residing on the corridor that work in those communities. In other words, 387 people residing in the corridor communities worked in Concord, NH in 2014.
- The commute destination data here does not include self-employed people or the military.

## Where Workers on the NH 10 S Corridor Live

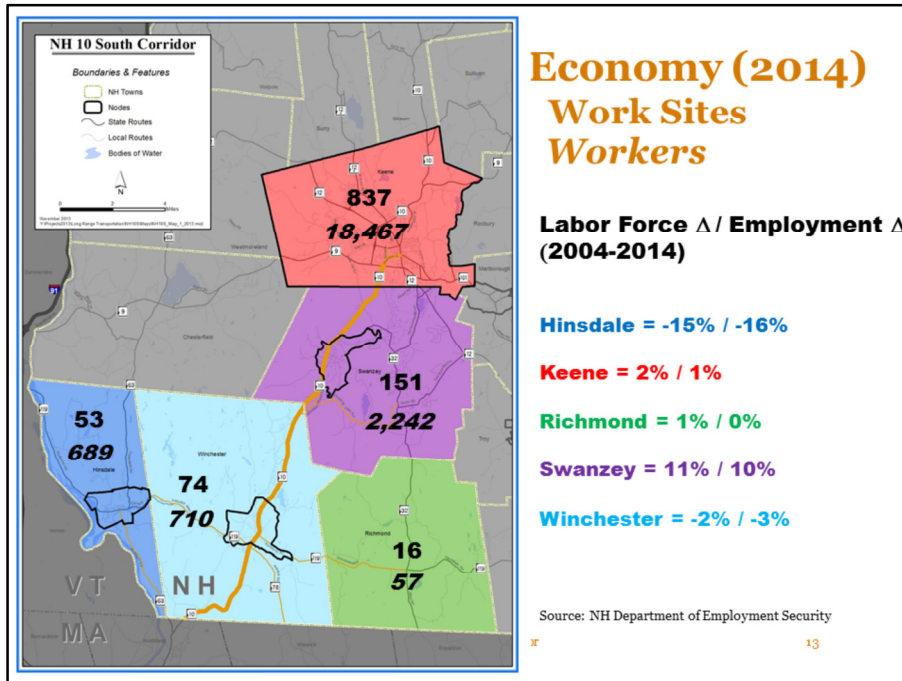


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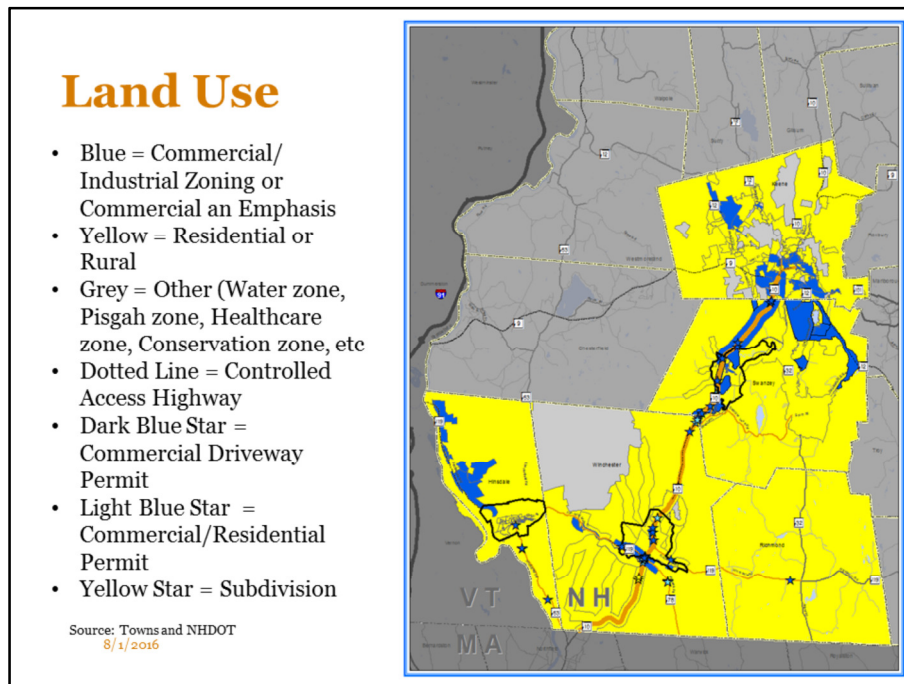
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- Unlike the commuting map earlier that showed about 30 percent of the population commuting 25 miles or more each way to work, people that work on the corridor are much more concentrated on or near the corridor communities. The draw for workers is fairly concentrated to people living in Cheshire County or just outside of Cheshire County.



- This slide looks at some economic indicators to give a picture of the NH 10 South Corridor economy.
- The numbers shown at the top of each community represent the number of work sites in each community tracked by the Department of Economic Security; The italics numbers shown at the bottom of each community represent the number of employed.
- On the right I am showing how each community's number of people in the labor force and jobs has changed from 2004 to 2014
- Each town has had very different economic experiences over the 11 year period
  - Swansey experienced both a boost in labor force and employment, Keene experienced very slow growth
  - For most NH 10 South corridor communities, it is likely that the local labor force will either grow slowly or recede as the labor force continues to age
  - Several towns lost jobs during this period—Hinsdale lost 375 jobs in the period. Winchester lost 60 jobs. Swansey and Keene gained 372 and 100 jobs respectively.



- This map shows a number of layers including generalized zoning, controlled access areas of the NH 10 highway and recent driveway permits granted by NHDOT.
- NH 10 is an important commercial corridor for Keene and Swanzey (see blue areas behind orange corridor)
- NH 10 is important to Winchester as well, but NH 119 West and NH 78 also play an important role.
- There is 3.4 miles of controlled access highway on this corridor running in Winchester from the Swanzey TL south.
- From August 2007 to July 2016 (roughly 9 years) there were 106 driveway permits issued by NHDOT on the NH 10 Corridor system:
  - 37 commercial,
  - 28 single family home or condo,
  - 11 residential/commercial
  - 14 resource extraction-related (gravel or logging) and
  - 9 permits issued for town roads opening on state highways
- None of this data includes the City of Keene which issues its own driveway permits

## Housing

	Ratio of All Housing Units to Jobs	Housing Unit Vacancy (Not Including Seasonal Units)	Estimated Percent of Housing Units that are Seasonal Units	Housing Permits Issued 2010-2014			
				Single Family Units	Multi-family Units	Mobile Home Units	Total Units
Hinsdale	~3:1	7%	1%	-7	2	9	4
Keene	<1:1	6%	1%	17	116	14	147
Richmond	~5:1	8%	8%	7	0	0	7
Swansey	~2:1	5%	3%	24	55	-5	74
Winchester	~3:1	7%	6%	4	7	4	15
<b>Totals</b>				<b>45</b>	<b>180</b>	<b>22</b>	<b>247</b>

Source: NH Office of Energy and Planning and 2010 Census Summary File 1

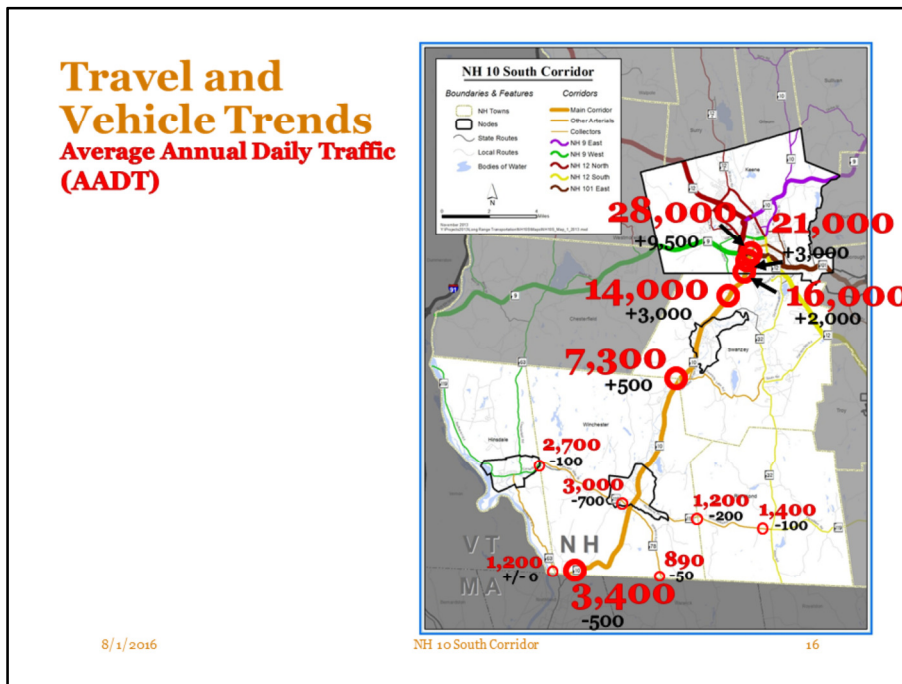
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- Experts believe that a significant percentage of retirees are expected to age in place in New Hampshire. This is also expected for the NH 10 South Corridor communities.
- If that is the case, there is a question of where workers will be coming from to fill today's jobs. Unlike other parts of SW NH, many of the communities are not necessarily bedroom communities. The ratio of housing units to employment is relatively close. Only Richmond has a relatively high number of housing units to jobs. If residents stay in place, there is a possibility that there will not be a large supply of nearby housing to house local workers.
- Vacant housing rates—when accounting that some of the vacant housing is seasonal, appear to be in relatively good margin.
- Building permit activity—with the exception of Keene and Swansey—has been relatively slow.
- If economic activity picks up and if gas prices remain relatively high and vehicle transportation will remain the sole mode of choice—it may be a challenge to attract workers if the pace of building more housing in the area does not pick up.

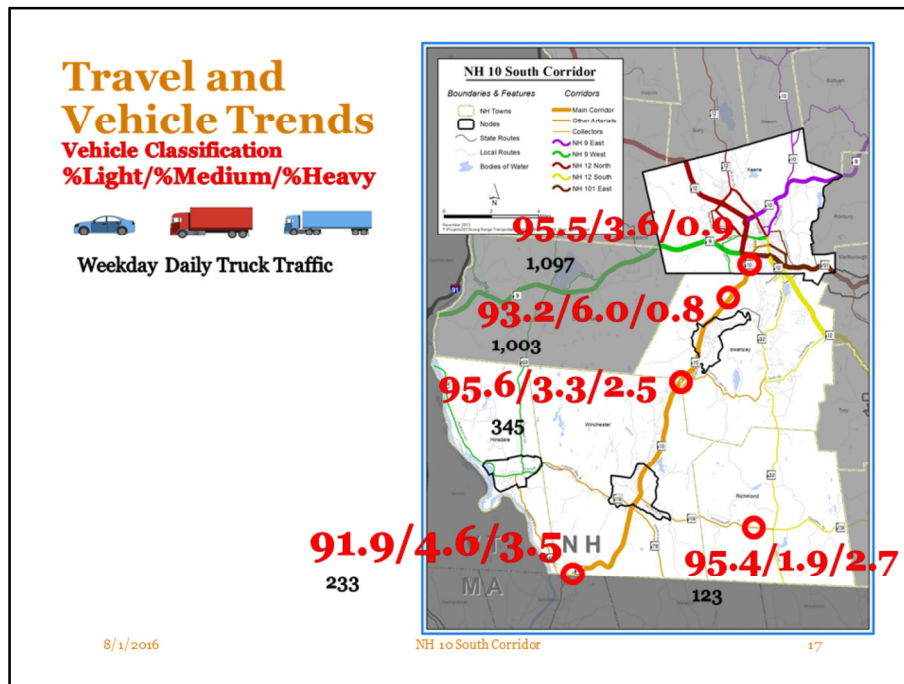




- Vehicle travel is monitored throughout the state through the federal Highway Performance Monitoring System. There are roughly 6,000 sites throughout the state that are sampled every three years, and over 400 sites here in Southwest New Hampshire. The short term samples are then converted to average estimated traffic figures, or Average Annual Daily Traffic (AADT). That is, on average, the number of vehicles that travel a section of highway per day. Actual figures can vary at each site, sometimes significantly, by time of year. In most cases, actual figures are higher than those reported above during the summer, and lower during the winter. It should also be noted that estimates can sometimes be impacted by changes in regional travel as a result of detours and construction, sometimes located far from the monitored site.
- On the map above, which shows the NH 10 South Corridor, the largest circles represent locations along the NH 10 South main arterial and the smaller circles are locations off the main arterial (Island Street, Winchester Street, Swanzey Lake Road, NH 119, NH 78, and NH 63). Text in black indicates the recent change in estimated AADT compared with an estimate 6 years prior. It is important to note that this range is influenced by the global recession. It should also be noted that the average annual New England fuel price in 2008 was

\$3.299 according to the Energy Information Administration. From north to south:

- Winchester Street north of NH 10/12 Roundabout in Keene – 28,000 in 2013, 27,000 in 2010, 18,500 in 2008, 22,000 in 2005
- NH 10 (Winchester Street) north of Kit Street in Keene – 21,000 in 2014
- NH 10 (Winchester Street) north of Matthews Road in Keene – 16,000 in 2013, 16,000 in 2010, and 14,000 in 2007
- NH 10 (W. Swanzey Road) south of Base Hill Road in Swanzey – 14,000 in 2013, 13,000 in 2010, and 11,000 in 2007
- NH 10 (Keene Road) at Swanzey Town Line in Winchester – 7,300 in 2013, 6,800 in 2007
- NH 10 (Manning Hill Road) at Massachusetts State Line in Winchester – 3,400 in 2013
- Off the primary arterial, volumes were estimated as follows:
  - NH 119 west of Main Street in Winchester – 3,000 in 2013
  - NH 78 at MA state line in Winchester – 890 in 2013
  - NH 119 at Winchester town line in Hinsdale – 2,700 in 2013
  - NH 63 at MA state line in Hinsdale – 1,200 in 2013
  - NH 119 (Winchester Road) at Winchester town line in Richmond – 1,500 in 2015
  - No stations were available on Westport Village Road, Homestead Avenue, or Swanzey Lake Road in Swanzey
- Traffic volumes were the highest in Keene on the NH 10 South Corridor, where they demonstrated strong short term growth. Factors that may influence changes over this period include the Great Recession and changes to commercial development in this area. Traffic volumes outside of Keene and Swanzey were all found to be in decline over the same time period.
- Unlike other corridors, there is no permanent traffic recorder to display the long term trend. The estimated figures above would suggest growth in Keene and Swanzey and decline or stable travel in Hinsdale (NH 63), Winchester, and Richmond.



- A subset of these traffic sites were analyzed with respect to the classification of vehicles. Different schemes may be used to classify vehicles. One common way is to separate light duty, medium duty, and heavy duty vehicles. Light duty vehicles include passenger cars and trucks, medium duty vehicles include “single-unit” trucks, such as a box truck or interstate buses, and heavy duty vehicles include tractor trailer combinations of varying lengths and number of axles.
- The figures above depict the fraction of light, medium, and heavy duty vehicles as a percentage of total traffic (%light/%medium/%heavy) for the following sites (from north to south) on the NH 10 South Corridor:
  - NH 10 south of NH 10/12/101 Roundabout in Keene
  - NH 10 south of Base Hill Road in Swanzey
  - NH 10 at Swanzey town line in Winchester
  - NH 10 at Massachusetts state line in Winchester
  - NH 119 west of NH 32 in Richmond
- Text in black indicates the weekday average daily number of medium-duty and heavy-duty vehicles observed during each traffic study.
- For more information, consult A Profile of Freight Transportation in

Southwest New Hampshire.

- Truck traffic volumes, especially single unit truck volumes, are high in Keene and Swanzey on NH 10, but for traffic near the Massachusetts state line, the single unit truck numbers drop off sharply. This may indicate that a lot of the single unit truck traffic is either local, and/or more heavily using the northern portion of the corridor near the Keene bypass system to go on to use NH 9, NH 12 or NH 101. Two companies that have large fleets of single unit trucks—Clark Distributors and UPS—have facilities located on lower Winchester Street in Keene and are likely to influence the single unit truck volume numbers. In addition, Market Basket and Hamshaw Lumber are located near the Keene and Swanzey town line, and are expected to attract a number of trucks. Not surprisingly, the Island Street bridge does not have much tractor trailer traffic as it has a weight restriction of only 15 tons and some tractor trailers are twice that weight when empty.

## Asset Condition

- Pavement Condition
- Bridge Condition
- Red List Bridges

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- *Southwest Connects*, the regional transportation plan for Southwest New Hampshire, incorporates performance measures to understand the states of different assets on each corridor. Some performance measures are borrowed from MAP-21/FAST Act, while others come from NH DOT's Balanced Scorecard. For this presentation, we will focus on three performance measures relevant to the Corridor.

Improve Asset Conditions

## Pavement Condition

### NHDOT Balanced Scorecard

#### Road Comfort Index

— Good	No Work Required	- greater than or equal to 3.5
— Fair	Some Work Required	- between 2.5 and 3.5
— Poor	Major Work Required	- less than or equal to 2.5

### MAP-21/FAST Act Performance Requirements

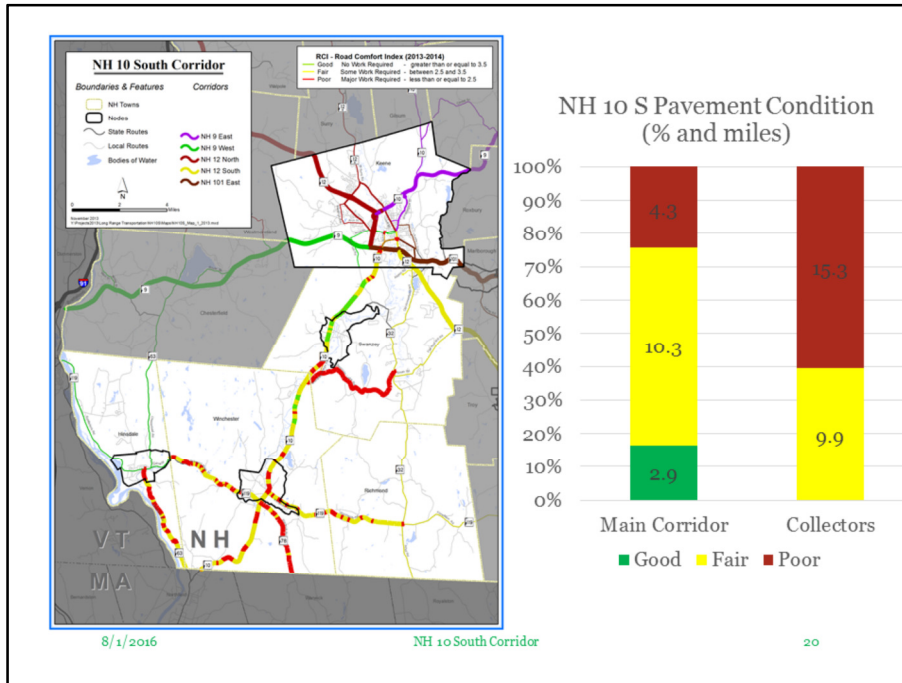
- Measures: % Interstate Good, % Interstate Poor  
% NHS Good, % NHS Poor
- Calculation: Ride Comfort Index (International Roughness Index)  
Cracking Percent  
Rutting

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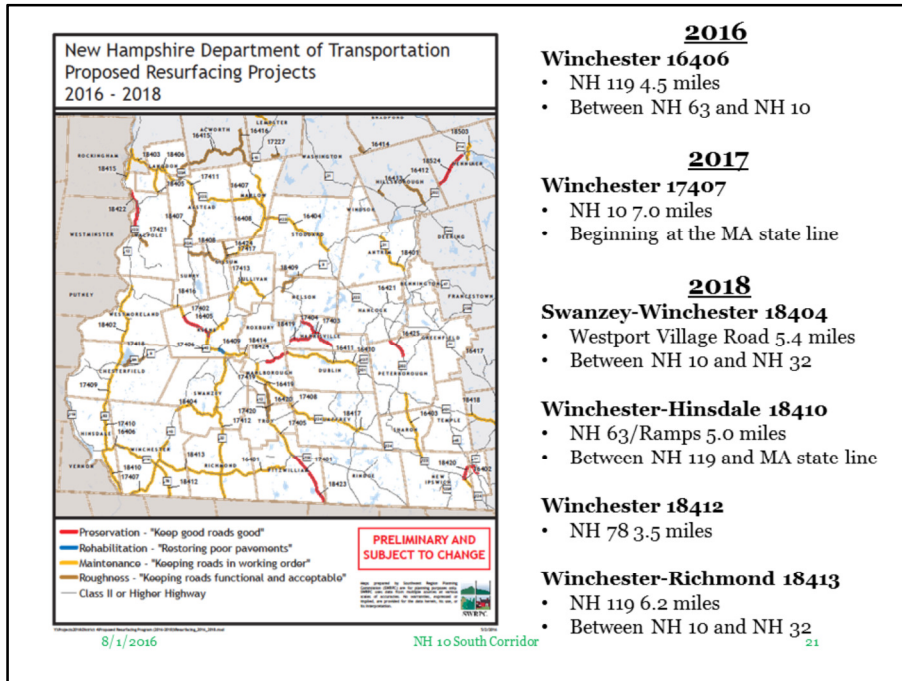
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- NHDOT currently utilizes the Road Comfort Index, or RCI, to measure the condition of its roads. MAP-21, superseded by the FAST Act, introduced a new rule that will require that the States also incorporate rutting and cracking into their calculations of pavement condition. SWRPC expects to have access to this additional information in the future.
- The condition measures proposed are listed on the slide above: percentage of interstate pavements in good and in poor condition, and the percentage of non-interstate National Highway System pavements in good and in poor condition. Although not all corridors included National Highway System mileage, SWRPC continues to provide information for all surveyed portions of each corridor including non-National Highway System arterials as well as collectors. NH 10 S, the subject of this presentation, is not part of the National Highway System.
- Today, SWRPC continues to provide information on the percentage of pavements in good, fair, and poor condition, as provided by the most recent data from NH DOT (2013-2014).



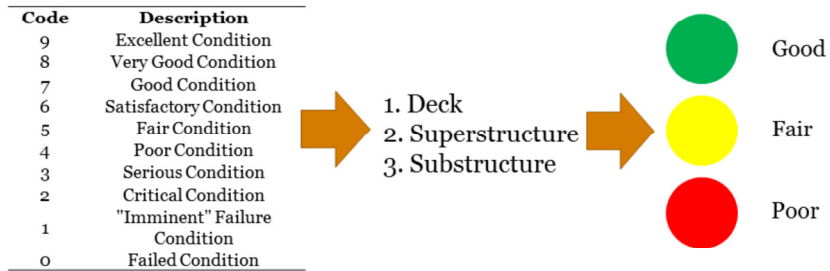
- Today, pavement condition is recorded utilizing specialized sensors, which record pavement condition attributes in 1/10<sup>th</sup> of a mile increments in one direction of travel. National Highway System and Interstate mileage is surveyed every year. Other numbered routes and unnumbered state highways (like Swanzy Lake Road) are surveyed every other year.
- 2013-2014 NH DOT 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. There were no “good” condition portions of the primary arterial and less than 20%, about 2.9 miles, were recorded to be in good condition. Approximately three-quarters of the main arterial portion of the corridor was found to be in fair or good condition.



- The map and project list shown depict paving project areas in Southwest New Hampshire (2016-2018). The first two digits of each project indicate the year of the project.
- Due in part to SB 367, the Corridor will see an increase in paving operations over the next three years (2016-2018).
- The primary strategy implemented is referred to as “maintenance”, generally designed to keep roads in working order. The strategy utilizes relatively low-cost treatments to address pavement needs for roads that are still in reasonable condition. Periodic paving will have to occur to keep the road in a reasonable condition because maintenance paving does not completely fix the pavement needs.
- Generally, in order to be eligible for maintenance paving, the road cannot have been reconstructed or rehabilitated within the last 5 years and the average international roughness index (IRI) must be lower than 300 in / mile.



Improve Asset Conditions  
**Bridge Condition**



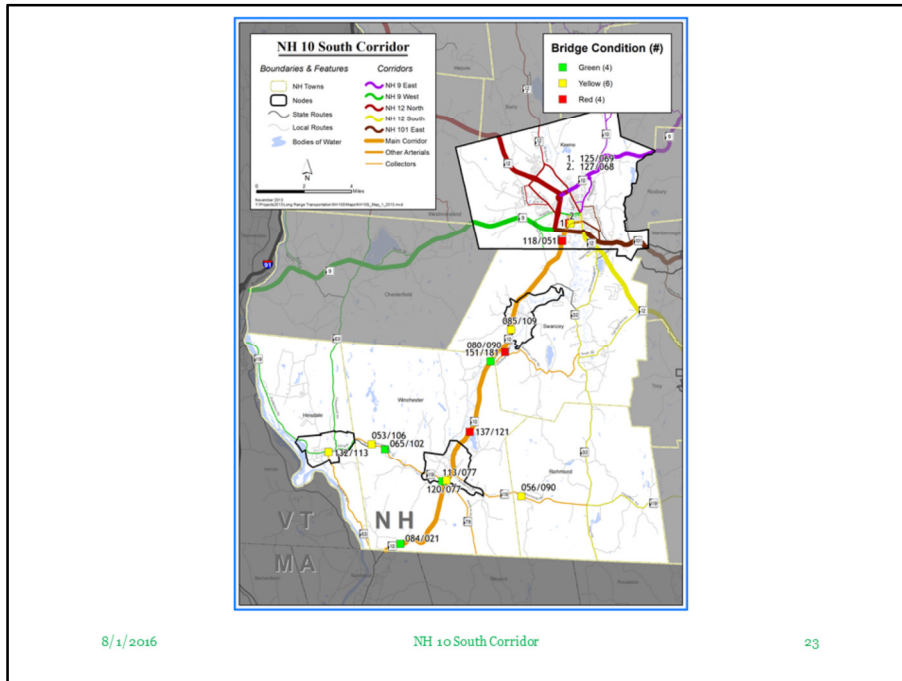
Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges  
 USDOT FHWA Report No. FHWA-PD-96-001

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- Bridge inspection data is available once per year (April) from the Department of Transportation. This can make results somewhat of a lagging indicator, depending on the time of inspection and scheduled maintenance, reconstruction, or replacement.
- 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.
- Under MAP-21 performance measures, which rely on the National Bridge Inventory (NBI), 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. For a Culvert, which only has one rating in the NBI, 7 or higher is good, 5 or 6 is fair, and 4 or lower is poor.



- There are 14 bridges located directly on highways of the NH 10 S Corridor system. The map pictured shows that 4 are “red-list” bridges:
- In Keene, 125/069 (Island Street over Ashuelot River) is a locally-owned red-list bridge with a 15-ton weight limit. It was last inspected in July of 2015. Although the bridge has all three structural elements at the level of satisfactory or higher, it is a temporary structure and is subject to the inspection interval of structures in worse condition. Replacement of the bridge will occur as part of Keene 10309B (2019-2020) The deck of 127/068 (Winchester Street over Ashuelot River) is in fair condition based on a deck rating of 5 and superstructure and substructure ratings of 6. It was last inspected in July of 2015. The second red-list bridge in Keene on the Corridor is 118/051 (Winchester Street over Ash Swamp Brook) was built in 1941. Both deck and superstructure ratings were assessed in poor condition at its last inspection in July of 2015. Replacement of the bridge will occur as part of Keene 40666 (2022-2025).
- In Swanzey, 080/090 (Westport Village Road over Ashuelot River) is a locally-owned red-list bridge originally constructed in 1862. It is a historical covered-bridge that is considered functionally obsolete. However, all three condition rating criteria were 6 or higher.
- In Winchester, 137/121 (NH 10 over Forest Lake Outlet) is depicted as a red-list bridge according to most recent inspection data (November 2015) with both the deck and superstructure in serious condition (3). The bridge was recently repaired through NH

DOT's bridge maintenance program and not through a specific project.

## **Improve Safety**

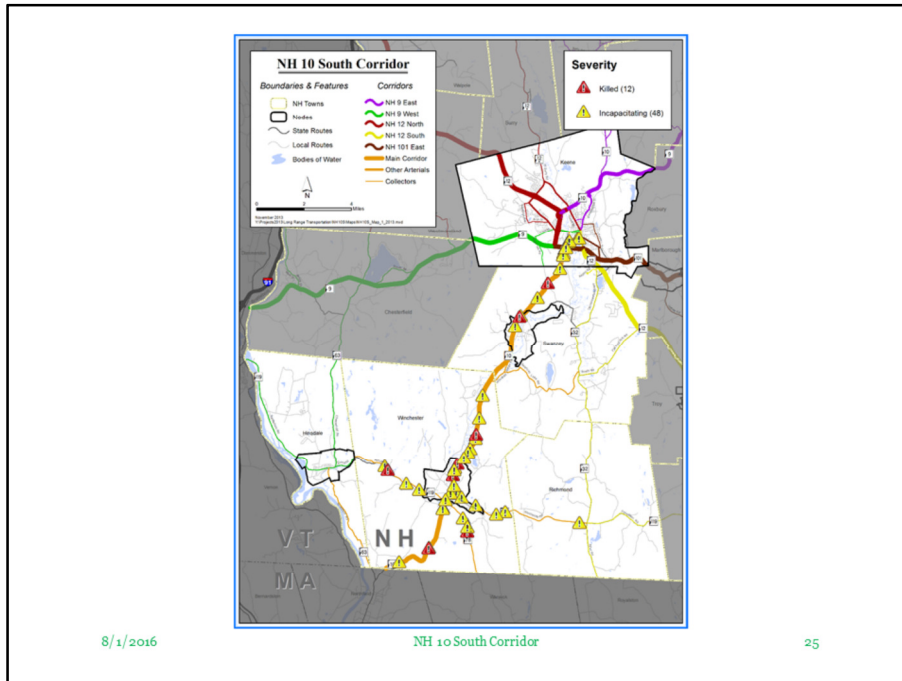
- **Rolling 5-Year Average**
  - **Fatalities: From MAP-21/FAST Act**
  - **Serious Injuries: From MAP-21/FAST Act**

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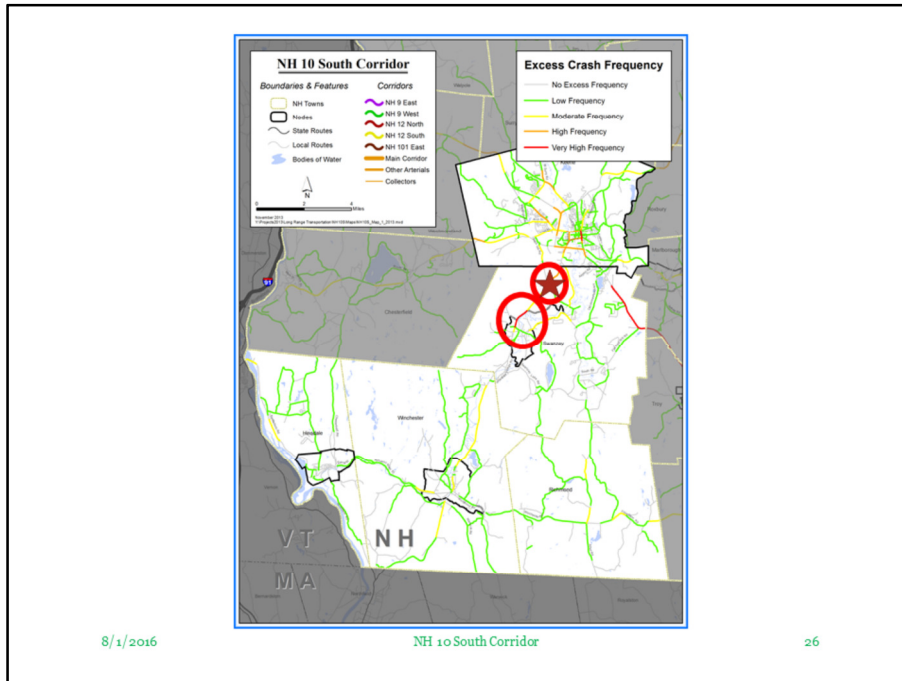
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- Like infrastructure, safety can also be monitored using performance measures.
- Currently, the FHWA requires States to measure safety by tracking fatalities and serious injuries, measures that are recorded with every accident report on US highways. This is accomplished by normalizing the rates based on vehicle miles traveled, as well as averaging statistics over a 5-year period.



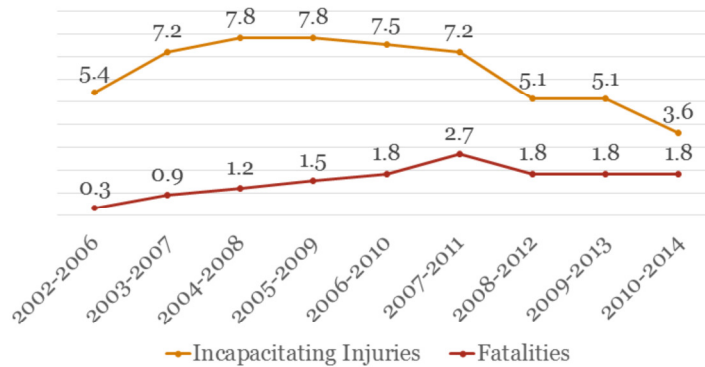
- Here is a map showing fatality and serious injury crashes in the NH 10 S Corridor for the period we have data available (2002 – 2014).
  - Keene: 0 fatalities, 11 incapacitating injuries
  - Swanzey: 3 fatalities, 4 incapacitating injuries
  - Winchester: 8 fatalities, 33 incapacitating injuries
  - Hinsdale: 0 fatalities, 0 incapacitating injuries
  - Richmond: 0 fatalities, 1 incapacitating injuries
- Over that time period, there were a total of 12 fatalities and 48 incapacitating injuries on NH 10 South and its collectors.
- The number of these occurrences is the first “ingredient” to the performance measure.



- Safety professionals also rely on statistical techniques to uncover areas with relatively poor safety performance. NH DOT utilizes a predictive model in accordance with the Highway Safety Manual to examine the performance of highway segments and intersections.
- Two segments, located on NH 10 in Swanzey are in the top 5% worst performing in the State based on the frequency of injuries.
  - West Swanzey Rd between mile 13.07 to 13.552 – NH 10 just south of its intersection with Base Hill Road.
  - West Swanzey Rd between mile 14.958 and 15.018 – NH 10 south between North Winchester Street and Sawyers Crossing Road
- One intersection, NH 10 at Base Hill Road, appears on the State’s top 100 list of lowest performing intersections, with respect to safety (according to 2002-2011 crash data).

## Per 100 Million VMT

NH 10 S Corridor Injury Severity  
(5-Year Moving Average Per 100 Million VMT)



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- Since the MAP-21/FAST Act performance measure is based on a 5-year rolling average, SWRPC gathered historical data to show changes in fatalities and incapacitating injuries.
- The rolling average of serious injuries and fatalities is useful because it reduces “spikes” that may happen from year to year. NHDOT currently supports this effort through a target of zero deaths and to reduce the five-year average fatalities and serious injuries statewide 50 percent by 2030.
- Adjusting the fatality and serious injury rates based on the amount of travel on each corridor allows SWRPC to make comparisons between corridor systems. When comparing safety performance between an arterial and a less busy collector, it also takes away the bias from the principal arterial carrying the majority of annual daily traffic.
- The rate, per 100 million annual vehicle miles traveled over a 5-year period, is consistent with proposed MAP-21 rulemaking.
- Recorded traffic volumes were used to estimate the annual traffic in vehicle miles traveled or VMT.
- In absolute terms, NH 10 South accounted for approximately 3.6 incapacitating injuries per 100 million vehicle miles travelled per year, and 1.8 fatalities per 100 million vehicles miles travelled per year according to 2010 to 2014 crash data and traffic volume data.

## Improve Mobility

### Level of Service

$$\frac{v}{c} = \frac{AADT \times K \times D}{L \times F}$$

Where

*AADT* Average Annual Daily Traffic

*K* Percent of AADT occurring during peak hour

*D* Directional distribution during peak hour

*L* Total number of lanes per direction

*F* Maximum flow rate

**\* Based on 2011 data**

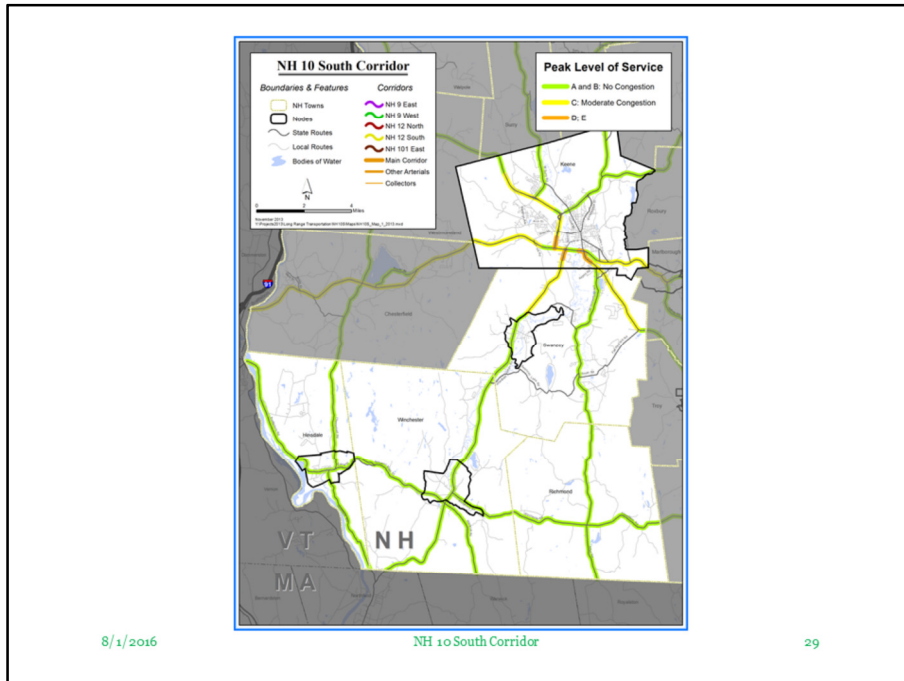
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- Another key performance measure that MAP-21 and NHDOT are concerned with is mobility, generally speaking, the relative ease of travel. Measuring delay, either directly or indirectly, is one a common way transportation planners evaluate mobility. Nationally, MAP-21 has the stated goal of congestion reduction on the National Highway System.
- MAP-21 has not finalized its performance measure regarding mobility at this time. NHDOT is currently reassessing the best way to measure mobility.
- Since the status of mobility measures are in flux, SWRPC has temporarily used volume/capacity ratio and level of service (LOS) as a temporary way to measure mobility. A highway's volume to capacity ratio determines its LOS by comparing the peak hourly rate of flow in vehicles per hour, to the capacity of that road.
- The map utilizes the average peak hour of the average peak month. The results factor in the number of lanes, the theoretical maximum flow per lane, as well as directional distribution. A indicates no congestion. B and C indicates moderate congestion.
- In the future, NH DOT will provide actual travel times per road segment for improved measurement of delay.





- The above map depicts level of service during the peak hour of demand during the day.
- The highest modeled rates of peak hour congestion occurred in the vicinity of the NH 10/12/101 traffic circle in Keene. NH 10 south of Keene into Swanzey was modeled to experience moderate peak hour congestion.

## Improve Multimodal Accessibility

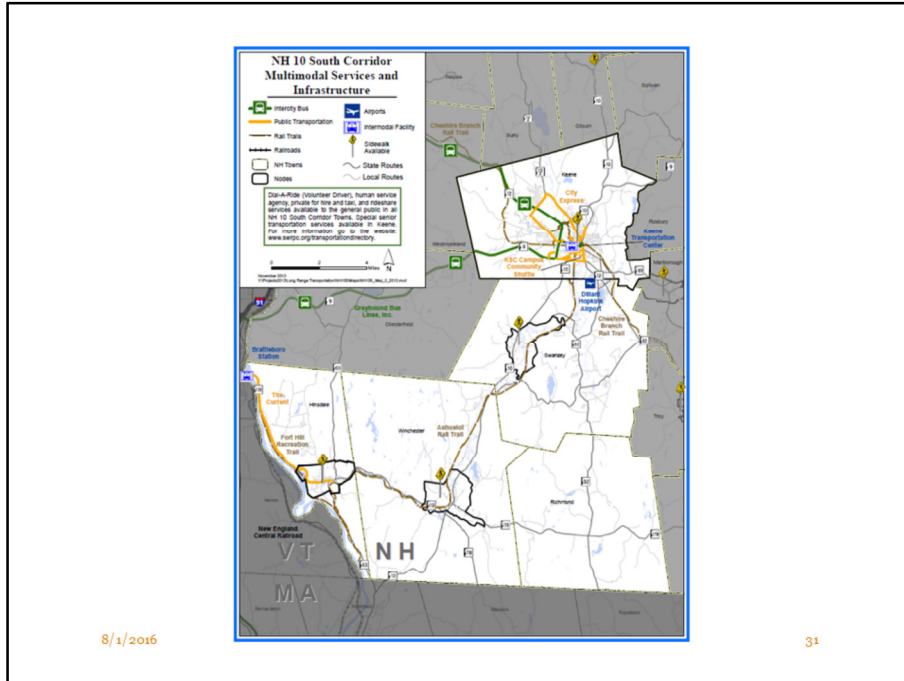
- Sidewalks: From Monadnock Alliance for Sustainable Transportation (MAST)
- Bikeways: From MAST
- # of Park and Ride Lot Spaces: From MAST
- Public Transit Routes: From MAST
- Intercity Bus Routes: From MAST

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- Multimodal accessibility is not a performance measure that is yet being used by MAP-21. NHDOT's Balanced Scorecard has some measures but they are in a state of research and development. As a result, the Southwest Connects Plan, decided to use multimodal measures that are currently being measured by the Monadnock Alliance for Sustainable Transportation in its Action Plan. This plan looks at mileage of sidewalks, bikeways, # of park and ride lot spaces, mileage of public transit routes and mileage of intercity bus routes over time.



- 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.
- The NH 10 South corridor includes intercity bus routes provided by City Express in Keene (and one destination in Swanzey). The Current also serves downtown Hinsdale, just off the NH 10 S corridor on NH 119.
- All communities on the corridor have sidewalk infrastructure and access to the Ashuelot Rail Trail, which has been substantially improved in Swanzey. In addition, the Ashuelot Rail Trail will likely benefit from KEENE - SWANZEY 10309P, a bicycle and pedestrian bridge over NH 12/NH 101, scheduled to be completed in 2016.

## Regional Transportation Challenges – Opportunities?

- Winchester Street urban compact multiple access points/traffic
- Only about 20% of the Corridor's abutting land is protected by state controlled access
- Maintaining safety on Manning Hill (steep inclines, tight curves, high altitude, lack of sunlight) continues to be a priority for Winchester.
- Highest proportion of low income population (20%) of any other corridor (8,093)
- 4 nodes associated with corridor—bicycle/ped safety a question (Keene, W. Swanzey)

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- SWRPC is aware of some transportation challenges associated with the NH 10 Corridor. These include:
  - A need to monitor access management on the highway due to a number of commercial zones on the highway and little controlled access along the highway.
  - Improving safety conditions on Manning Hill wherever possible.
  - A relatively large low income population—does the corridor provide enough in the way of affordable transportation options?
  - There are four nodal centers associated with this corridor. Bicycle and ped safety improvements are needed in these denser parts of the corridor.

## Past Projects

- Winchester-Swanzey 12906 – Replaced bridge on NH 10 over Ashuelot River
- Winchester 15881 – Rehabilitation of NH 119 bridge over Ashuelot River
- Swanzey 14421 – Improve 13,000' of Ashuelot Rail Trail with crushed granite hard pack surface
- Winchester 16034 – Construction of sidewalks on Warwick Road and Main Street
- Winchester 29483 – Culvert improvements for NH 10 over Forest Lake Outlet

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- Several projects are scheduled in the near term in communities along the corridor.
- For more information about these projects contact SWRPC.

## Future Programmed Projects

- Keene 10309B - Reconstruction from NH 101 Roundabout north to Pearl St/Island St including Key Rd intersection
- Keene 40666 - Reconstruction of Winchester Street from NH 101 to Swanzey town line

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- Several projects are scheduled in the near term in communities along the corridor.
- For more information about these projects contact SWRPC.
- 10309B: Reconstruction from NH 101 Roundabout north to Pearl St/Island St including Key Rd intersection (Construction 2019, 2020)
- 40666: Reconstruction of Winchester Street from NH 101 to Swanzey town line (Construction 2025)

## Other Future Projects?

### Keene

- Complete Streets Policy Implementation?

### Swanzey

- Complete Streets Policy Implementation?

- Ashuelot Rail Trail?

### Winchester

- Manning Hill improvements?

### Hinsdale

- Complete Streets Policy Implementation?

### Richmond

- ?

### Regional

- Transit Service?

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- Over the years, SWRPC has been approached with other project ideas. Here is a list.
- SWRPC encourages you to contact their office to talk about your project ideas. Should they be in the Ten Year Plan or are there funding programs that can help make them reality and address the Corridor community's transportation needs?

# ADDITIONAL DISCUSSION

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- We hope this has provided some useful information for thinking about the NH 10 South Corridor System.
- Our hope is that data and analysis will provide an opportunity for the SWRPC TAC, NHDOT, municipal officials, and state legislators to work together to develop consensus on projects or initiatives that will continue to address the corridor's greatest challenges and opportunities.
- We look forward to hearing your thoughts. Contact J. B. Mack at 357-0557.
- For further reading visit [www.swrpc.org/regionalplan](http://www.swrpc.org/regionalplan) to read *Southwest Connects*